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VETERINARY MEDICINE

JUNE 1944

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No. 6

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A study of 400 tuberculous patients by Faber and Miller, showed a definite niacin and riboflavin deficiency in 25%—100 of them.—*J. Am. Med. Ass'n*, Feb. 19, 1944.

Infection of a laboratory worker with the fowl virus of New Castle Disease was reported recently in *Medical Journal of Australia*. The inoculation was in the conjunctiva—a result of the accidental squirting of chick embryo allantoid fluid into the eye.

The Department of Tropical Medicine of Harvard University in collaboration with the American Foundation for Tropical Medicine has sent an expedition to Liberia to study the spread and control of African sleeping sickness. Intensive studies are to be made of the tsetse fly—its habits and way of life.

An outbreak of typhoid fever in the province of Quebec, causing 40 cases and six deaths, was traced by the provincial health department to infected cheddar cheese made at a small factory described as being "rather filthy and foul with flies." It is believed the infection derived from a known typhoid carrier who, in violation of instructions, assisted in milking a small herd of cattle, the milk of which was delivered to the cheese factory.

The Bureau of Animal Industry recommends that, to prevent hemorrhagic septicemia, feeder and stocker cattle be treated at least 10 days before shipment, with either bacterin or aggressin.

Veterinary Officer Receives Legion of Merit Award

Major Frank A. Todd, Veterinary Corps, U. S. Army, was awarded the Legion of Merit by General Eisenhower in orders published on 12 February 1944. The citation accompanying the award follows:

Major Frank A. Todd, Veterinary Corps, United States Army, for exceptionally meritorious conduct in the performance of outstanding services as Veterinary Officer, Iceland Base Command, from 16 September 1941 to 1 June 1943. Major Todd was responsible for the establishment and maintenance of proper sanitary standards for the American military personnel in Iceland Base Command. In addition to his assigned duties, Major Todd rendered great assistance to the government and people of Iceland in the fields of animal husbandry, farm conservation, and research in connection with the diseases of Icelandic domestic animals. Through Major Todd's intelligent and enthusiastic efforts relations between the Icelandic Government and the people of the United States have been greatly enhanced. Entered military service from Iowa.

Nutrition has such an important bearing on disease that it may be regarded as a branch of medical and veterinary science.—*R. M. Bethke.*

Site for Liver Puncture

Liver puncture with a trocar has been used for the ante-mortem diagnosis of equine infectious anemia, but the usual site of injection (in front of the 15th rib) sometimes leads to injury to the intestine and in other cases is difficult because of atrophy or abnormal position of the right lobe of the liver. Wittfogel has found that inserting the trocar just in front of the 13th rib, on a line level with the hip joint, is more successful, the trocar thus reaching the liver from the anterior surface after penetrating the diaphragm and a thin section of the lung. It should be mentioned that others do not regard the biopsy method as dependable in the diagnosis of equine infectious anemia.

Encourage Your Clients to Get Rid of Rats

Rats are saboteurs[1] of the most destructive sort, it appears from figures compiled by biologists of the U. S. Fish and Wildlife Service. The damage they caused last year is estimated at more than $200,000,000. Rat damage went up during 1943 not so much because there were more rats as because the cost of commodities in general had increased. Higher cost of living means higher cost of keeping rats on the premises. Men experienced in rat control estimate the over-all rat population of American farms at around 60,000,000. The farm is the rat's great stronghold with plenty of hideouts and plenty of food he can steal. Cities harbor fewer of the vermin. Improved ratproof construction, better clean-up of garbage and the vanishing of the city horse, are cited as factors in the rats' back-to-the-farm movement. In addition to their role of thieves, rats are incendiaries. They steal matches, gnaw wire insulation, cause leakage of chemicals. Worse still, these vermin harbor smaller vermin (fleas) which in turn are carriers of two much-feared diseases—the American form of typhus fever and bubonic plague.

[1] *Science, Supplement,* 99:2559, p. 12, 1944.

In limited tests made at Auburn, Alabama, research workers of the U. S. Department of Agriculture and of the Alabama Polytechnic Institute found that horses on a ration of white corn and poor grade Johnson grass hay (both low in protein) developed anemia and icterus following medication with phenothiazine, but in horses fed oats and No. 2 leafy alfalfa hay, no toxemia was apparent after treatment with the drug.

Fantastic Habits of Pests

A cockroach gets an entire new skin (which is its skeleton) seven times before it grows up.

One billion germs can be raised from a single germ in the laboratory in one day.

Only female mosquitoes bite; the males sit contentedly on the bushes and suck sap.

Many germs give off two kinds of poison—a toxin when living and an endotoxin, when dead.

Many modern disinfectants will kill germs 50 or 100 times as fast as does strong sunlight.

Some household pests can live months without any food whatsoever.

Some female insects devour the bridegroom after the honeymoon. The praying mantis invariably does that. The black widow spider gets her name from that trait—she is always a widow.

Virgin births are common in the insect world. The common aphides reproduce all summer without any males in the flock.

Moths do $200,000,000 damage annually in the U. S.

It is mathematically possible for a pair of flies to have 2,000 billion descendants in a single season!

Flies are the greatest insect menace in the spread of disease. The average fly will carry one million germs on its hairy legs and body, leaving a trail of germs on whatever it lights.

There are more ants in the world than any other single creature and in many sections they are annoying household pests. Most of the ants in a colony are workers, which are undeveloped females. The males, usually winged in most species, die after mating with the queen.

Prospects of State Veterinary Medicine

There has ben a trend in recent years toward state veterinary medicine. On this account it is urgent that the relationship of the private practitioner with those now engaged in state veterinary medicine be placed upon the most mutually beneficial basis possible, not only for the immediate improvement of both services, but that in the event state veterinary medicine should be largely extended, it will not find the profession unprepared for its new obligations, nor those less qualified be in a position to usurp functions that should be lodged in professional hands.

We have a large degree of state veterinary medicine at the present time. It includes our army veterinary service, federal meat inspection and other routine work of the Bureau of Animal Industry of the U. S. Department of Agriculture, the veterinary section of our experiment stations (federal and state), federal and state veterinary laboratories, the state veterinary extension service, the state live stock sanitary services and veterinary functions exercised by city and state boards of health and other municipal authorities as a part of our regular official governmental system. In addition, we have the federal-state cooperative animal disease control projects for tick fever, bovine and avian tuberculosis and Johne's disease eradication and hog cholera and bovine brucellosis control. Altogether, these services constitute a vast network of state veterinary medicine.

An extension of meat inspection to the majority or all of the states, extension of veterinary service to the Rural Resettlement Administration, extension in milk inspection and the inclusion of veterinary service in the county health services now being promoted by the U. S. Public Health Service might conceivably, within a brief period, place the major part of our veterinary service within state veterinary medicine.

The veterinary profession being unable to influence broad social trends is unlikely to be able to either stem or accelerate the increase in state veterinary medicine. By taking forethought it may be able to guide the trend to the end that a better veterinary service is established than would otherwise result. But it will take thoughtful planning. Ranting about "socialized medicine" can neither hasten nor delay extension of state veterinary medicine but conceivably it can work to the disadvantage of the veterinary profession and the livestock industry by giving the impression that the profession is uncooperative. The veterinary profession in this country has long (but not always) been proud of its state veterinary medicine—the federal and state veterinary services and our schools and public laboratories. It is most desirable that any extension of state veterinary service, if it comes, shall be of a sort that we can continue to have pride in its achievements.

The prescience of leaders of the veterinary profession has often been notable for its absence. For more than a decade after the Federal Bureau of Animal Industry was established, it and its leaders were berated at annual meetings of the national association, for many of their activities. When it established a federal system of meat inspection the move was condemned on the ground that the veterinarian's responsibility ended with the slaughter of the animal and that post-mortem inspection to determine the wholesomeness of meat for human consumption was a function of the medical profession. The discussion of bovine tuberculosis at veterinary meetings was bitterly resented by many during the first decade of this century, and when the eradication project was finally undertaken it was criticized by not a few, because initially it was necessary to send federal men into their territories to do the testing. The veterinary profession has never wanted for leaders who could talk loudly but those who could think profoundly have been responsible for its progress. The two capacities have seldom been integrated.

Army Needs Transport Animals

Despite mechanization of modern weapons of war, the value of the horse on the field of battle has been dramatically rediscovered during the past winter and has been the difference between success and failure by the Russians.

It is an old cavalry axiom that a horse can go wherever a man can travel. This is still not true of the tank, truck—or even the faithful jeep. This winter on the Russian front, horses have packed men, munitions, supplies and weapons over impossible and practically impassable terrain. Pulling wagons, sleighs, caissons and guns, horses have kept pace with the Red Army.

In Italy the cry for horses, mules, and more horses became almost a howl during the past winter months as troops operating in treacherous mountain country faced the problem of packing in food, ammunition and other supplies and packing out wounded men.

Zebu Bull. American Armed Forces in India use these animals for both food and draft. Their dispositions are consistently bad, their tempers unpredictable and veterinary officers who must examine them before purchase do not like them. There is considerable satisfaction, however, in making the post-mortem examination

Because of the attractive prices offered by the Quartermaster natives bring their animals by the thousands to sell to our troops in India. Before purchase veterinary officers examine them for rinderpest, anthrax, foot-and-mouth disease, piroplasmosis, surra (carriers) and the diseases, wounds and other ailments from which cattle everywhere suffer. The illustration shows cattle being examined for foot-and-mouth disease

Once again the horse filled the vital need, and many an old cavalryman watching man's beast of burden pass a column of mud-embedded motor transport smiled a knowing smile.

The German army has used the horse to supplement its motor transport from the first day of war, and on the Eastern front has developed the use of animal-drawn vehicles to a scale almost equalling that of World War I. In China, both the Japanese and Chinese find the military value of the horse undiminished when used to support campaigns in mountainous terrain. And the god of war, still crazy over horses, has given many a recent victory to the army commander who has been able to assemble sufficient animals to meet the needs of the military situation, planes, trucks and tanks notwithstanding. — *The Stars and Stripes.*

Animal Experimentation Is Humane

It has been argued by some that animal experimentation is useless and cruel. As to the charge of uselessness the answer is given by history. As to the charge of cruelty, I have a word to say as a man who has been engaged in animal experimentation for over a third of a century, and should know something about it. Cruelty is the wanton or useless infliction of suffering on man or animals. I know the biological and medical research laboratories in this country and abroad, and can state as a fact that in animal experiments involving pain the same anesthetics are used as in surgical operations on man. Neither man nor the animal needs an anesthetic to stand a mosquito bite or the passing of the hypodermic needle through the skin. Moreover, an animal in distress usually cannot answer the questions put to him by the medical investigator. When animals under anesthesia are used in medical teaching, they are not allowed to come out of the anesthesia. Death by anesthesia is probably the least uncomfortable. There is inflicted on animals more pain in one hunting, trapping and fishing season than in all the centuries of animal experimentation. The pain inflicted by the hunter, fisherman, and trapper is not wanton, to be sure, and yet inevitable. For what purpose? For the most part for the joy of chase, the possession of furs (as ornaments often), for food and joy of the strife which causes pain and eventually death by suffocation or bleeding.

We use animals, by common consent, for food, for clothing, for labor, for pleasure. How can it be wrong to use animals humanely to increase our understanding of life, our control of disease, both of which contribute to human happiness? We must retain the sense of proportion. Man survives only by destruction of plant and animal life for his food. Man's welfare demands either death control or birth control of the animal, but these must be carried out humanely. When the animal dies as a part of biological and medical investigation, the death is humane. We cannot indict or convict of cruelty to animals our universities, medical schools and hospitals on any evidence so far brought forth.

Biological and medical investigation and teaching, guided by the humane behavior of the sane and civilized man, must remain free, must not be restricted, lest a hundred years hence our descendants will foregather, not to celebrate another century of progress in biology and medicine, but to condemn dreary decades of medical and biological stagnation.—*A. J. Carlson, President, American Association for the Advancement of Science.*

Conservation of Insulin

An acute shortage in the supply of insulin has developed and the government requests all slaughterers to save pancreas and ship them to insulin manufacturers. The shortage is believed to be largely a result of the large number of animals that have by-passed the normal channels of trade to the black market and other temporary slaughterers interested only in meat and on above ceiling prices.

More than one million diabetics in this country have been restored to normal productive lives by the use of insulin.

New Base for Ointments

An ointment base that can be whisked from clothes or skin with plain water has recently been developed. Greasy, messy ointments and salves may soon be a thing of the past. Many formulas have been proposed but the most promising to date is one developed at laboratories of the American Pharmaceutical Association. Smooth and "washable," the base consists of cetyl alcohol, white wax, propylene glycol, sodium lauryl sulfate, and water.

The alcohol used is a giant molecule, compared to your rubbing alcohol, which makes it a white, wax-like solid. In combination with the "wetting" agent, sodium lauryl sulfate, it causes medicinal agents to penetrate the skin better. It is also greaseless and permits the heat of an inflamed area to escape more readily; discharged fluids are not sealed in as is often the case with greasy salves.—*Science Service.*

In reporting cases of footrot in cattle to the Maine Veterinary Medical Association, R. E. Ingham of Waterville recommended removal of all necrotic tissue, and that all diseased portions be painted with mixture of equal parts of phenol and camphor, daily for about five days. This should insure complete healing in about 10 days.

✓ ✓ ✓ ✓

At the time of the American Revolution (1776) no medical journal had been published in the English language. The first one to be published was the *London Medical Journal,* established in 1781. The *Lancet,* the oldest English medical journal, was established in 1823. The first English veterinary journal, *The Veterinarian,* was established five years later.

✓ ✓ ✓ ✓

Sanitary Control of Milk

Adequate supervision of the milk supply is one of the important functions of public health agencies. Of all the factors of man's environment, none is more important to his welfare than food. Of all foods, none is more important than milk. That milk should be clean and safe for human consumption is obvious. That its cleanliness and safety must be insured by governmental control has long been recognized. In the United States today such sanitary control is being exercised on a very considerable scale. —(U. S.) *Pub. Hlth. Repts.* 59:6 p. 189.

✓ ✓ ✓ ✓

New Dehairer for Hogs

Traditional hog-scalding to remove the hair in butchering may soon be "out," replaced by a new scientific method. In the new process porkers are plasticized and peeled. The carcass is submerged in a tank of liquid plastic, then pulled out coated with the sticky stuff. When properly cooled, the plastic is stripped off, taking all the hair with it. The process is quick, clean, thorough and economical. The plastic used is a resin chemical. After being used on one hog it is remelted and used again and again. Bristles, whiskers, stubble and hairs are removed from the liquid before it is re-used. They are just as suitable for commercial uses as if they had been removed by the old scalding-scraping method.—*Science,* 99: 2561, p. 12.

Two of the vitamin B group, niacin and riboflavin, appear to be necessary to the functioning of the blood producing organs and a deficiency of either leads to anemia, is the conclusions of scientists at Duke University and the University of Wisconsin.

✓ ✓ ✓ ✓

Recent studies have shown that ordinary egg powder loses, as a rule, 66% of its vitamin A content in three months but, if 2% of wheat germ oil is added to the liquid egg before spraying, the loss is only 44%. If the egg powder be compressed (1200 lbs. per sq. in.) it retains 48% of its vitamin A but if wheat germ oil has been added practically 100% of this vitamin is retained.

✓ ✓ ✓ ✓

Many "Sided" Disease

Fowl paralysis, or avian leucosis complex appears, in seven distinct forms as follows:

1. Neural lymphomatosis (range paralysis).
2. Ocular lymphomatosis (blindness).
3. Visceral lymphomatosis (big-liver disease).
4. Osteopetrotic lymphomatosis (thick-leg disease).
5. Erythroblastosis (anemia).
6. Granuloblastosis (anemia).
7. Myelocytomatosis (anemia with tumors).

✓ ✓ ✓ ✓

Reporting Contagious Diseases

We need a system of compulsory reporting on the prevalance of contagious diseases of animals. If such veterinary vital statistics were available, the problem of contagious disease control could be made far more effective and more intelligent control programs could be outlined. In Europe, such reports are required and this is undoubtedly one of the reasons why, in spite of their many difficulties, they have been generally more successful in controlling contagious diseases of animals in view of their greater difficulties. It is easy to visualize the benefit to be derived from an outline map of the United States each year showing the outbreaks of the various contagious diseases of animals. The value of such records would increase with their accumulation over a period of years.—*C. H. Stange.*

The Control of Mastitis

In common with many other veterinarians of my acquaintance, I have from time to time met herds in which *Str. agalactiae* infection has been very prevalent, and in which all the methods of cowshed hygiene commonly advised have proved of little or no avail in controlling the spread of infection. When such instances have occurred, it has been customary to attribute the cause to lack of effort on the part of cowman and milkers or to some slip-up occurring from time to time. A few months ago, however, I came to the conclusion—after experiencing two such breakdowns in herds when I had every reason to place absolute reliance on the herdsman and milkers—that the fault was in the system of application, and that this fault was one that now appears to be a most obvious omission in the accepted methods of mastitis control.

It is agreed that the common method of infection is *via* the teat duct, and that infection can easily be passed from cow to cow by the milkers' hands, teat cups, etc. The common system of cowshed hygiene advised provides for the cleansing of the udder and teats before milking, the use of hypochlorite antiseptic solution before milking, and the dipping of the teat cups in water followed by dipping in hypochlorite solution where machine milking is used.

The cows are then milked by hand or machine and then stripped. In probably more than 90% of herds the teats are left in a wet condition, with a thin coating of milk over them—an ideal medium for bacterial growth. The cow is turned out and is brought in for milking again after an interval of 8 to 16 hours, depending upon whether the next milking is morning or afternoon.

It would appear that the system of cowshed hygiene in vogue is an adaptation of a system designed to produce clean milk rather than a system to control contagious mastitis. Failure to cleanse the teats with a hypochlorite antiseptic after milking is an obvious omission.

Since instituting such a system in mastitis herds the degree of control achieved has shown remarkably encouraging results—so much so that I have made it a routine in all herds. I have come to the conclusion that it must be an essential feature of cowshed hygiene and that it is a far more important factor from the point of view of mastitis control than cleansing the teats prior to milking.

The cleansing of the teats after milking, using a hypochlorite solution and leaving them as dry as possible, is in my opinion a most important factor in mastitis control and should be an integral part of cowshed hygiene in all herds.—G. N. Gould, M.R.C.V.S. in the *Vet. Rec.*, 55:51, p. 491.

* * * *

There is an interrelation in the utilization of various vitamins, minerals and hormones by the body. Thus, for the utilization of iron, it is essential that a balance be maintained between calcium and phosphorus and copper. The utilization of Vitamin A is limited by a lack of vitamin D; all other vitamins may be rendered useless by lack of vitamin B_1, and various of the hormones function normally only in pairs or groups.

* * * *

Ladino-Clover Profitable

In an experiment during 1942-43, as to the comparative values of alfalfa-grass mixtures and Ladino-clover mixtures for pasture for sheep, the Indiana Experiment Station reports the following results in terms of pounds per acre and returns per acre from lambs sold:

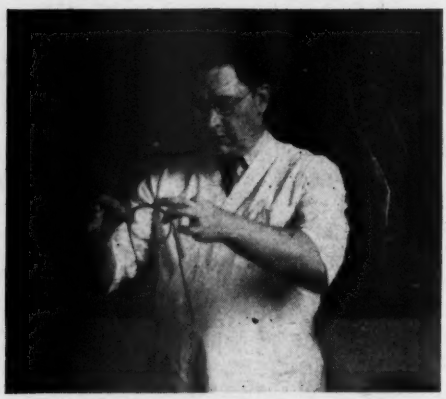
Alfalfa-grass, rotation grazing, 99.6 pounds with returns of $14.34 per acre.

Ladino-grass, continuous grazing, 120.7 pounds with returns of $17.83 per acre.

Ladino-grass, rotation grazing, 106.5 pounds with returns of $15.60 per acre.

The alfalfa-grass mixture consisted of eight pounds of alfalfa, two and one-half of timothy and five of brome grass per acre; the Ladino-grass mixture was four pounds of Ladino clover, two and one-half of timothy and five of brome grass per acre.

During 1942-43 the winter-kill of the alfalfa was 25 to 30% but there was no Ladino winter-killing.



Dr. R. E. Nichols of Purdue University, at present on military leave, demonstrating the construction and application of a modified Thomas splint for reduction of a fracture in a cross-bred chow, four months of age. The completed operation is shown in lower of the two illustrations above

Radiograph of the fracture for the reduction of which the splint is being constructed. The fracture may be seen with difficulty at the lower margin of the illustration

Complications of Fractures in Dogs

The exciting causes of bone fractures in the dog[1] may be divided roughly into two groups: gross direct external violence and less severe, often indirect, violence. In the first group, street accidents form by far the commonest causes. The radius and ulna are the bones most often involved, followed closely by the femur and the tibia. In the majority of cases the fracture is complete, sometimes comminuted, sometimes compound, whilst occasionally several bones are involved. Generally, there is considerable displacement of the fragments, and soft tissue injury. The second group is of greater interest, for in these the cause is usually indirect violence of slight severity—a force which the bone would probably have withstood, had the muscles associated with it been coordinated. The tibia is the bone most often involved, followed closely by the radius and ulna, and the femur. In the latter, the neck is as often involved as the shaft. In many cases the fracture is subperiosteal or epiphyseal. Fractures due to street accidents occur about twice as often in juvenile as in adult animals. The fracture due to a simple fall is essentially a disease of immature animals in which ossification is not yet complete. Simple accidents in the adult dog are much more likely to result in a sprained joint. In the fore-limb the shoulder and carpus are the common sites; in the hind-limb, the stifle. The humerus is easily fractured in short-legged animals. Injuries to the hip are correlated to age. Too great stress cannot be placed on the necessity for radiographing the bone.

The most common complication involves articular surfaces — veins are frequently lacerated, resulting in hematoma and in edema. The musculo-spiral nerve is more commonly injured. Extensor paralysis of a fore-limb may accompany fractures of the neck of the scapula or of the shaft of the humerus. Gross fractures of the pelvis may be accompanied by paraplegia due to the displacement of the sacrum. Often some vital soft tissue is, or becomes, damaged.

[1] Wright, J. G., *Vet. Rec.* 49:2-10.

Fracture Splints for Dogs

The veterinary profession has made considerable progress in the handling of fractures of the limbs in their canine patients. Early in veterinary surgery there was not any satisfactory method of handling bone injuries involving the hip, lower third of femur or thigh bone, and the bones of the fore leg close to the shoulder and elbow. When broken bones involved these situations, the end result was marred by distortion and displacement resulting in permanent lameness.

The use of modifications of the Thomas splint makes the handling of anatomically difficult fractures much easier. The fragments can be placed in correct relation to one another and checked by the use of the fluoroscope and x-ray. There are a number of modifications of this splint, named for the veterinarian responsible for the particular model which he has produced. Actually all are based on the principle of a metal ring with two arms which are long enough to reach the ground. A sliding device is used in some so that extension may be procured.

The ring is well padded. Through it the injured limb is passed, and it is fitted into the axilla or groin. The extension must be longer than the leg so that traction may be applied. The application of this splint requires very careful and skilled handling. If the patient is not kept under observation and restraint slipping or change in pressure may result in injury or pressure gangrene.

The veterinarian is handicapped by inability to place his patient in bed. As soon as a dog recovers from shock and the pain of the fracture becomes endurable, it wants to resume its usual habits. Under old conditions this invariably led to displacement and sometimes to the development of fibrous instead of bony unions.

The advent of the modified Thomas splint allows free movement of the patient within the confines of its cage in the hospital without retarding the healing or causing undue shortening or deformity.—*Edwin R. Blamey* in *Kennel Gazette*.

A soft wire of proper length and diameter is bent to fit well up on the ham. It is then padded and adjusted to position. The leg is then pulled until it is of normal length and bandaged and taped firmly to hold the ends of the broken bone in apposition

The Veterinary Service of China

A CONSIDERABLE number of American veterinarians are with our armed forces in China at the present time and the indications are that many more will be sent there in the not distant future. The following description of the Chinese veterinary service and animal disease conditions at the outbreak of the present Sino-Japanese War takes on added interest on that account. The following discussion is reprinted from the December 1937 issue of Veterinary Medicine. War of course always causes a more or less complete breakdown of livestock sanitary regulations and it is a fair inference that the animal disease situation in war-torn China is much worse now than it was seven years ago:

Veterinary education in China is classified into (1) traditional and (2) modern.

1. The traditionalists acquire their meagre knowledge of veterinary medicine through apprenticeship. They number about 5,000. Their distribution is nation wide. Upon them mainly rests the welfare of the live stock industry of China. Owing to their limited and unscientific training, they are ill adapted to bear this enormous responsibility. Horses and cattle, because of their economic importance in rural districts and great use in the army, receive the most medical attention; sheep, goats and swine receive little attention; dogs and cats being given no consideration whatsoever.

2. The modern class of veterinarians are graduates of Chinese or foreign veterinary colleges. Their number is small. The graduates from foreign schools include five from Iowa State College, two from Michigan State College and one from Kansas State College; four from French schools, and a dozen from Japanese schools. Practically all the graduates of foreign schools occupy leading positions in the field of veterinary medicine—prominent practitioners, professors, chief inspectors, bureau heads, etc.

There are three centers of veterinary education in China—(1) Military Veterinary School, (2) Animal Husbandry and Veterinary Medicine of the Central Agricultural College of National Central University, and (3) the Veterinary School at Shanghai.

The Military Veterinary School was inaugurated 33 years ago. Its 500 graduates constitute the entire body of army veterinarians (in peace time) and part of the meat inspection force in public health institutions.

The Department of Animal Husbandry and Veterinary Medicine was organized in 1929. It gives a four-year course in animal husbandry and veterinary medicine combined. Because of political considerations, the school has graduated but a score of students. They are engaged mainly in teaching.

The Veterinary School at Shanghai was opened in 1932 and gives a two-year course in veterinary medicine of collegiate grade. Its graduates number about 50 per year. The objectives of the school are to train young men for meat inspectors and in the control of epizootics.

The live stock industry of China suffers an annual loss of hundreds of millions of dollars from epizootics. It is officially estimated that the services of ten thousand additional graduate veterinarians are needed.

The Epizootic Prevention Service under the Ministry of Industry, was organized in 1932 and carries on, in addition to epizootic prevention, investigation of disease distribution, diagnosis of diseases, research and production of sera and vaccines. Its appropriation for all five projects is $40,000 annually. The loss from poultry diseases alone is 50 million dollars a year!

In addition, there are seven district epizootic preventive services. That of the Taihing district comprises a veterinarian, a clerk and a three-room hospital engaged in swine disease control. Its budget is $2,600 annually. Swine plague is the most costly disease in the district. Hog cholera is less prevalent. The Shanghai district epizootic prevention service is engaged in combating rinderpest and bovine contagious pleuropneumonia and, occasionally, outbreaks of foot-and-mouth disease. By far the largest district organization is that of Kwangsi Province, where $350,000 was spent for a serum laboratory (VETERINARY MEDICINE, Oct. 1937, p. 451).

There are five biological laboratories engaged in the production of sera and vaccines for use in animals. The products produced include: Anti-hog cholera, rinderpest, swine plague (polyvalent), hemorrhagic septicemia (polyvalent) and chicken cholera (polyvalent) sera and swine plague, hemorrhagic septicemia, chicken cholera, staphylococcus, swine contagious pleuropneumonia, rinderpest and hog cholera bacterins or vaccines. The price of the various sera is about $40 per liter (about 12 times the average cost of anti-hog cholera serum in the U. S. A.).

Veterinary research is rudimentary.

Rabies occurs wherever dogs are found; swine plague and hog cholera are coextensive with swine; rinderpest occurs enzootically each year; anthrax is a serious problem; fowl cholera periodically sweeps the whole country, and 60% of the army horses are infected with glanders.

References

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Veterinary Medicine, 29:8, pp. 326-28.

Brucella Infection in the Horse

Subject.—Chestnut cart gelding; six years old; purchased from a farm for work in the town in September, 1942. The horse worked satisfactorily until February, 1943, when it fell slightly lame. Bruising of the foot was diagnosed and in a week the horse was about to be re-shod, when it became acutely lame. After some days, an obvious shoulder lameness was presented with swinging gait of the off fore limb and a slight swelling just below and to the outer side of the point of the shoulder. This swelling persisted and showed no pus or exploratory punctures.

Mild local treatment was followed by blistering the affected area on two occasions without benefit.

In the middle of April, a fluctuating swelling appeared on the near side withers —the side opposite to the lame limb. Here appeared a solution of the cause of the lameness, and a blood sample revealed an agglutination titer of 1 in 80 against *Br. abortus*. It seemed a reasonable assumption that the acute shoulder lameness was in the nature of an arthritis of the shoulder joint.

Treatment now turned to the use of dead abortus vaccine. The bovine strain was used at first and after the second injection a dramatic improvement in the degree of lameness occurred. The local reaction with abscess formation was so marked, however, that a request was made to the Laboratory of the Ministry of Agriculture for their dead abortus vaccine, equine strain. A course of three injections was given at ten-day intervals, but the local reactions proved as severe as before, as I was warned would be the case.

The withers swelling was not interfered with, but subsided slightly. The horse was now only slightly lame.

In July, lameness became slightly more pronounced and a further course of three vaccine injections was given.

At the end of August, the horse was almost sound and was shod preparatory to light work. Within a few days, however, lameness recurred along with a fistulous withers swelling now on the same side as the affected limb. A period of rest brought about no improvement, and it was decided that it was improbable that the horse would ever become workably sound. He was destroyed on October 5th.

A post-mortem examination was made of the affected limb and withers. The withers swellings contained a yellowish purulent material, the abscess cavities extending deeply downwards. At the level of the shoulder joint and on its inner side an encapsulated abscess the size of an orange was found. Exposure of the joint surfaces showed on the articular cartilage of the scapula deep erosions into the cartilage and necrosis around part of the rim of the joint.

The surface of the humerus was normal.

The lesions of the articular cartilage were obviously old standing, and it is remarkable that the horse ever approached any degree of soundness.—W. R. McKinna, M.R.C.V.S., in the *Vet. Rec.*, 55:51, p. 491.

* * * *

The increase in size of the horse during the evolution of the equine species is remarkable. The Eocene *Orohippus* was about the size of a fox. *Miohippus* and *Pliohippus* from the Miocene were about as large as a sheep. *Hipparion* and *Pliohippus*, of the Pliocene, equaled the ass in height; while the size of the Quaternary *Equus* was fully up to that of the modern horse.—*O. C. Marsh in Fossil Horses in America*

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The South Wants Mules

M. P. Jaragin of Georgia, stated at the recent annual meeting of the Horse and Mule Association in Chicago that high class mules are selling for $800 per span in the Southeastern States, at least $100 per head more than good work horses are selling for.

He stated also that there is a tremendous unsupplied demand for riding horses on the plantations of the South.

The Breeding Jackass

By KALO A. HINEMAN
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JACKASSES used for breeding purposes in the United States are principally of the American Mammoth breed which is of American origin, having in its ancestry mainly Poitou Jacks from France and Catalonian Jacks from Spain. These American Mammoth jacks are considered the best to be found anywhere for begetting mules. Before the war they were in demand in several foreign countries and were being exported extensively. They are valuable animals, worthy of the best attention.

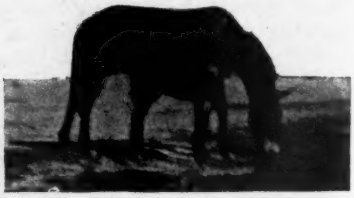
Breeding jacks are of two classes—"mule jacks" and "jennet jacks"; that is, those used for mule raising and those used for breeding jennets. Some jacks can be used for both purposes, but are likely to become "jennie spoiled"; i. e., having been used on both jennets and mares jacks often finally refuse to serve a mare. This condition may arise also from allowing the jack close contact with other jacks or with mules (mule spoiled).

The aforementioned situations may be handled in either of two ways. The most satisfactory method is to re-train the jack. That is, to handle him in the same manner that young jacks are handled when being trained for service to a mare. The jack should be turned into a small pasture with a young stallion or a young gelding. They should be left to themselves so that through the efforts of the horse the jack will become attached to him and thus to horses in general. They should be left thus, perhaps from one breeding season to the next. Usually by that time the jack is again ready to be used on his first mare. She should be definitely in estrus, gentle, and of the proper size for him. As at all times copulation should take place in a quiet, undisturbed place—a place with no other animals, and as few people as possible present. It is essential that there be nothing to distract the jack's attention. Another method is to have a jennet present with the mare that is to be bred, allowing the jack to prepare to serve the jennet. A third method seems worthy of consideration, i. e. artificial insemination.

The summer that a jack is 2½ years of age, he should be allowed to breed four or five mares. The next summer he may be used on 15 to 20 mares and the third season be may be put to full use. An adult jack may be used twice a day during the breeding season, but this does not mean that he should be used every day. At times he should be rested from one to three days.

General health is an essential factor to prompt and acceptable service by jacks. There are two rules of care which must be strictly followed: (1) a jack can not be fed a high concentrate diet and (2) a jack must have exercise.

Jacks should be fed plenty of good roughage. Prairie hay, oat hay and barley hay are satisfactory. Alfalfa hay should be fed only in limited mounts to adult jacks. Oats is the best grain for a jack. Corn



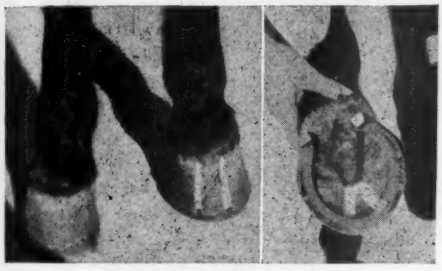
should be fed sparingly, if at all. One gallon of oats per day divided into two feedings is sufficient for most jacks. Salt and plenty of fresh water should be kept before them at all times. The mineral content of the feeds should be checked as to completeness. Mineral supplements, such as bone meal, should often be added to the ration for growing jack stock.

Often the inexperienced owner will try to fatten his jack. Such procedure with an animal of desert origin leads to disaster. Nevertheless, as most jacks in prime breeding condition appear rather poorly kept, many owners will attempt fattening—at the expense of the animal's virility.

Jacks of breeding age should be confined in separate stalls and must be turned into an exercise lot for a part of every day. In

this exercise lot a young horse should be allowed with the jack thus forcing him to exercise. However, this can be done only if the jack does not fight the horse. This sometimes happens. There should be green pasture of some kind in season in this jack lot.

Conditions attributed by many to a high concentrate diet, a lack of exercise or to a combination of both are as follows: (1) a decrease in acceptable service combined with a lowered fertility, (2) a lowered vitality and sluggishness of action with edema and swelling of the legs below the knees and hocks. This latter affection is observed most often in the hind legs but is occasionally unilateral. Often within a few days after the onset there will appear an open wound on the dorsel surface of the hock which, for want of a better term, is called a "jack sore." The etiology of this condition is not understood but, by a correction of the two predisposing factors listed, the symptoms are usually alleviated and the case cured. These sores should be treated as open wounds. Both corn and alfalfa hay, except in very limited quantities, contribute to this condition of plethora and accompanying ills.



Jacks suffer from a hoof ailment that resembles chronic laminitis. A hoof-grooving operation is recommended

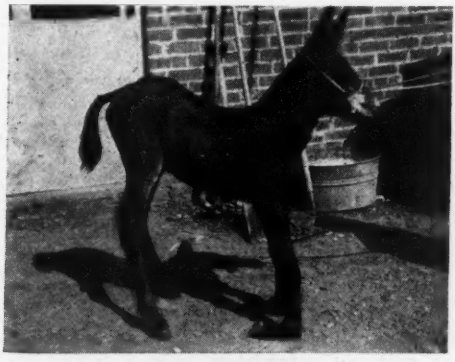
A chronic condition may arise in which there appears extensive roughening of the hoof walls and a tendency to cracking. In many of these cases the animal will show symptoms resembling those of chronic laminitis. A hoof grooving operation is recommended. Other cases may develop a condition not unlike seedy toe and should be treated as such.

Jacks must have their feet trimmed every 30 to 60 days. They should be observed carefully for evidences of the onset of contraction of the tendons, especially of the fore legs. This contraction may occur either in the flexor or extensor group of tendons. In most instances these conditions can be alleviated by corrective shoeing. If the case is an advanced one, tenotomy is perhaps the best treatment.

Twin mule colts, that live, are extremely rare

Jacks should be examined regularly and frequently for lice—especially in jacks from one to three years of age which have not shed their long colt hair. Careful grooming aids in the control of the vermin. The first step in treatment should be to shear the animal, followed, in warm weather, by a bath of 2% pine oil or 1% solution of creolin.

The breeding life of a jack is longer than that of a stallion. Contrary to popular belief, the proper management of a jack for breeding purposes incurs little more difficulty than that of a stallion.



If the tendon contraction is severe, as pictured, tenotomy is necessary. Mule foals are only a little less susceptible to contraction of the tendons, than jack foals

Fermentation of Rumen Ingesta and Bloat in Dairy Cattle

FERMENTATION of the rumen contents is essential for normal digestion of fiber-containing feeds.* Enormous changes regularly occur in the environment of the bacteria responsible for this fermentation. The ingestion of water in varying amounts, the temperature and the consumption of feed varying from zero to 30% in fibers as well as in sugar content, are factors to be dealt with at a moment's notice. Apparent lack of palatability of a feed might simply be an outward indication of depressed fermentation in the rumen as a result of adverse environmental conditions.

Although no extensive study has been made of the organisms responsible for the fermentation in the rumen, many gas producing organisms, such as *Escherichia coli*, have been isolated from the rumen contents. The optimum pH for growth of *Esch. coli* and many similar organisms is around pH 7.0 or a little above. Studies have shown that the acidity of the rumen contents varies from pH 5.5 to 7.7. The hourly fluctuations depend largely on: (1) the chemical composition of the feed, (2) the amount of organic acids produced by the bacteria and (3) the neutralizing effect of the saliva being secreted. Fresh green feeds apparently increase the rate of fermentation and decrease the amount of saliva required for mastication resulting in a drop of the pH of the rumen contents. Dry feeds, especially roughages, result in a higher pH.

Since the optimum temperature for growth of many types of bacteria is between 37 and 45° C. (98.6 and 113° F.) it is quite probable that the changes in temperature occurring in the rumen do not seriously modify fermentation. One would expect the ingestion of large quantities of cold water to influence the temperature of the rumen only temporarily.

Dilution of the rumen contents with water affects the osmotic force of the milieu as well as the concentration of the soluble nutrients upon which the bacteria subsist. Dilution of the food supply probably affects bacteria less than dilution of their own metabolic products. Growing bacteria not only rapidly consume oxidizable materials like glucose but they also eliminate metabolic products which may interfere seriously with their own growth. Some of these decomposition products resulting from bacterial fermentation are: acetic, lactic and butyric acids, alcohol, ammonia, indol, skatol, hydrogen sulfide and mercaptans.

Analyses have shown that carbon dioxide and methane are the principal gases resulting from fermentation in the rumen, although hydrogen, hydrogen sulfide, carbon monoxide and other gases have been identified. Nitrogen and oxygen are also present as a contamination from the outside air. It has also been found that the percentage of CO_2 increased rapidly after feeding. On a grass diet the peak was reached far more quickly than when alfalfa hay and grain were fed. The relative amount of CO_2 in the rumen gas varies from 80% shortly after grass was fed to 10%, 24 hours later.

Although the amount of oxygen present in the gas in the rumen is relatively small the majority of bacteria are facultative or obligatory anaerobes and do not require free oxygen. The solubility of oxygen in water is so low that, were it not for the constant agitation of the rumen contents and the fact that much of the contents are out of water a large part of the time, it would appear improbable that strictly aerobic bacteria would ever survive and grow.

A wide variety of products serve as a source of feed for the bacteria in the rumen because bacteria secrete innumerable kinds of enzymes. Glucose and ammonium chloride are about the simplest sources of carbon and nitrogen for bacteria. Since the cow's ration doubtless always contains thousands of different compounds, either real or potential, it is not surprising if the usual changes in diet which take place on the farm only moderately influence bacterial fermentation in the paunch.

*Jacobson, N. L., D. Espe, and C. Y. Cannon. *Jnl. Dairy Sci.*, 25:9, pp. 785-799.

Carbohydrates are chief among the substances normally providing energy for anaerobic life. Sugars, especially glucose, greatly increase growth under anaerobic conditions. It should be noted also that anaerobic fermentation is exothermic and doubtless helps provide the heat for warming the water or other cold feed ingested by the cow.

Photo by E. T. Baker

A case of bloat due to acute indigestion

When considerable fermentation does occur, as indicated by excessive gas production, we speak of it as bloat or tympanites. This rarely occurs except when the cow is turned onto legume pasture. Although many analyses have been run on the principal constituents of legumes and non-legumes, no essential product for bacterial metabolism has ever been isolated from legumes which is not present in non-legumes. Hence there is no ready clue for determining why cows bloat frequently on legume and rarely on non-legume pasture.

Ingesta, obtained after the cow had eaten silage, fermented *in vitro* for 24 hours, produced less gas per gram of dry matter than ingesta obtained when the cow received only hay and a mixed grain ration. Bluegrass pasture and grain produced an ingesta definitely more acid than did alfalfa hay and grain. The ingesta normally became more acid as fermentation progressed. This increase in acidity was accompanied by a decline in rate of gas formation.

When feed was withheld from the cow for 24 hours, her rumen was not more than one-fourth full and most of the material was semi-liquid. Ingesta obtained at this time was alkaline and the rate of gas production was very slow.

Aliquot samples of the rumen contents were treated in different ways and the rate of fermentation compared. Changes in dilution, temperature and hydrogen-ion concentration, in the ranges normally occurring in the stomach, had little effect on the rate of fermentation. Amounts of salt which the cow would tolerate in her drinking water also had little effect in *in vitro* studies. Common minerals, such as limestone, accelerated fermentation probably through neutralization of the acids formed. Of a number of other materials tried, acetic and lactic acids tended to depress fermentation most severely while sodium formate had the greatest accelerating influence.

In their discussion of the results of the experiment the authors found that even under normal conditions gas is generated too rapidly to be absorbed without frequent eructations. In fact, the results indicated that green alfalfa does not stimulate gas production any more than green growing bluegrass. This led them to seek a physical explanation for bloat. Because the cows ate alfalfa three times as fast as bluegrass, added weight was given to this explanation.

The fact that injury from fermentation in the paunch never occurs with cows on legume pasture unless they bloat, would tend to indicate that the gases formed are not especially toxic. Most cows will be seen to eruct gas two or more times per minute while grazing. True, under increased pressure the rate of absorption of the gases produced is much greater and may be a contributing factor to death from bloat. However, the failure of the gas to escape normally appears to be the predisposing factor.

Roughage as ingested is dropped from the cardia into the recticulum and anterior compartment of the rumen. By running bluegrass and alfalfa through a meat chopper to simulate chewing, it was found that chopped alfalfa forms a much more compact mass than chopped bluegrass. At

the rate of grazing actually observed with cows which had been without food for 12 to 18 hours it is quite possible that such animals might ingest 50 to 100 or more pounds of this succulent feed before resting. This amount of material, if remaining in a relatively compact mass, would tend to force the stomach down against the abdominal floor and since the only entrance or exit to the stomach is at the esophageal groove anything which tends to depress the esophageal groove below the level of the fluid in the fore stomachs would tend to cause trapping of the gas within the rumen and bloating. This condition would be aggravated by the cow lying down, after grazing, to rest and chew her cud. As fermentation began to increase the freshly eaten mass would be buoyed up by the generated gas and might help to block the escape of the gas. Increased pressure would only seal the exit more firmly. Drinking water might wash part of this freshly eaten mass back into the rumen where it would normally be carried by the peristaltic contractions of the reticulum. On the other hand, if the mass was not dislodged the water would only make it more difficult for the gas to escape.

By palpation of the fore stomachs through a rumen fistula one finds that the reticulum contracts periodically with considerable force. This peristaltic wave throws the fluid in the reticulum over the more solid material in the rumen. A slow peristaltic wave then passes over the rumen and tends to squeeze out much of this fluid, taking with it some of the soluble material freed by soaking, maceration and bacterial action. The semi-liquid material flows forward into the reticulum. When a cow ingests quickly, large amounts of feed which compacts readily there appears to be danger of upsetting this normal physiological process. It is well known that the danger of bloating is greatest immediately after grazing.

This theory would account for the greater prevalence of bloating when cattle graze alfalfa covered with dew or frost by assuming that moistened feeds can be ingested more rapidly than unmoistened feeds. Less saliva would also be added to the fermenting material.

Corn Silage Is Economical

It is wise to feed good corn silage. Animals like it, for it offers a pleasing variety in winter when the remainder of the ration is made up of dry material. It is perhaps the most desirable supplement for lactating cows when pastures dry up in the late summer. Furthermore, proper ensiling saves a larger percentage of the feed value of corn than any other method of harvesting and storing it. Corn is an economical feed wherever it can be grown successfully. Its importance in the ration of dairy cows is indicated by the fact that one-half the entire corn crop of Wisconsin, the leading dairy state, is stored in the 125,000 silos in that state.

Importance of Vitamin A in Dairy Feeds

Vitamin A is one of the most critical needs of dairy cattle in winter.

Investigations by the Wisconsin experiment station have revealed that two or three months on poor feed are enough to deplete the vitamin A reserves of dairy cattle to a dangerous point, the vitamin A content of the blood dropping to about 15 micrograms per cubic centimeter.

If the vitamin A level of the blood remains that low for a considerable time, breeding trouble invariably follows. Cattle short of vitamin A eventually lose the power to build vitamin C, the latter being essential for fertility in both cows and bulls.

Trials also show that when cows become depleted in vitamin A reserves, the carotene and vitamin A content of their milk drops sharply. On the average, winter milk produced in Wisconsin contains only about one-half as much of these factors as does summer milk.

Young calves need abundant vitamin A or carotene if they are to avoid such diseases as scours and navel infection. It seems likely that the greatest single reason for widespread losses of calves in the late winter and early spring is no other than this: many calves are fed low-vitamin A milk from cows that have been kept on poor winter feed.—Cir. 337, Univ. of Wisc.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Phenothiazine in Cattle Practice

By J. W. BRITTON*
Davis, California

DURING the past several years phenothiazine has assumed a prominent position in veterinary therapeutics and promises to supersede many commonly used anthelmintics. The work with this drug in sheep and horses has been extensive, but its value in cattle and swine practice has been less firmly established. Despite the lack of intensive studies of phenothiazine therapy in cattle the drug has achieved wide use in the field with much of the information simply borrowed from sheep work. The resons for this widespread popularity are to be found in the relative ineffectiveness of other drugs commonly employed and the difficulties inherent in treating cattle individually. It is the purpose of this paper to review the available literature and report the use of phenothiazine in cattle under California conditions.

Parasitic Gastritis in California Cattle

Primary parasitic gastritis in cattle occurs in California in calves and steers being fattened on the lush, irrigated Ladino-clover pastures of the interior valleys. Calves are most susceptible although yearling and two-year-old steers will break down with primary parasitic gastritis if overcrowded on these pastures long enough. The onset and course are gradual and the cattle present typical symptoms of parasitism such as anemia, diarrhea, submaxillary edema, rough coat and emaciation. The more common form of parasitism is seen as a complication of malnutrition in the early fall in range cattle. As a rule only the yearlings are affected and in contrast to primary parasitism, the onset and course are rapid. In some cases the cattle die within two weeks after showing rapid emaciation and terminal diarrhea. The rapid course has often led to an erroneous diagnosis of hemorrhagic septicemia. Usually it will be found that the ranges have dried up except for small areas of green feed around water holes, springs, and creek beds. The cattle tend to gather around these places for four to five hours daily and undoubtedly acquire massive infections rapidly which, in connection with the inadequate feed on the ranges, produces the clinical picture of extreme parasitism described. As the winter rains bring on the green feed on the ranges, improvement becomes apparent and many recover spontaneously. When older cattle are likewise affected, infections with the liver fluke, *Fasciola hepatica,* are almost invariably present in addition to stomach worms.

Finally, parasitic gastritis is observed in the north coast counties as an important factor in a disease complex described by Britton.[1] In this complex, which affects dairy calves principally, lungworm, malnutrition, lice, calf pneumonia and parasitic gastroenteritis are frequently found coexistent and it is usually impossible to determine the primary etiological factor. In all forms of parasitic gastroenteritis found in California, *Ostertagia ostertagi* and *Trichostrongylus axei* are the principal parasites involved.

Dose and Method of Administration

Early workers with phenothiazine in cattle[2,3,9] used rather large doses, up to 125 grams for calves six months of age. It soon became apparent that smaller doses were just as effective and recently Simms, *et al*[7] and Swanson[11] have recommended doses as low as 0.1gm per pound of body weight with a maximum does of 60 grams. Actually in order to completely remove 100% of the *Ostertagia ostertagi* present, Porter[4] found 0.2gm per pound to be necessary although *T. axei* can be eliminated with smaller doses. On the other hand, in California, doses of 15 grams for calves and 30 grams for yearlings have proved satisfactory as judged by the prompt clinical improvement after the administration of such doses.

The most practical method of administration in California has been by means of gelatin capsules although where convenient it can be administered readily in the grain ration. When it became apparent that pri-

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mary parasitic gastritis in lambs could be prevented and controlled by allowing lambs free access to a 1 to 10 phenothiazine salt mix, it was decided to attempt this method of administration in cattle. Several wide scale field trials were conducted with cattle on various types of pasture, but in no case did they consume enough of the medicated

Primary parasitic gastritis occurs in calves and steers being fattened on Ladino-clover pastures. Calves are the most susceptible

salt mix to provide effective control. It was, therefore, decided that routine preventive treatment must be relied on to control bovine parasitism.

Phenothiazine in Primary Parasitism

Three outbreaks of primary parasitic gastritis in cattle running on irrigated Ladino clover have been investigated. The first outbreak involved seven dairy calves from four to six months of age. Prior to the treatment with phenothiazine, four had died and the necropsy had revealed extreme emaciation, subcutaneous and visceral edema, and overwhelming *O. ostertagi* and *T. axei* infections. The remaining three were stunted, scouring, weak, anemic and listless. Each was given 12 grams of phenothiazine in capsules. Within three days the diarrhea had stopped and the calves made a satisfactory recovery. Obviously, the effects of the severe stunting were never overcome.

The second outbreak involved 16 yearling Guernsey heifers which had been losing weight, scouring and becoming weaker for several months. Five had died of gross parasitism and two others were so weak they could scarcely rise. All had been treated with 1% copper sulfate and 1% nicotine sulfate solution (cunic) several times with no apparent improvement. Each of the surviving eleven head was given 30 grams of phenothiazine in gelatin capsules and all recovered satisfactorily. The two that were down and barely able to rise required a second dose three weeks later.

The third outbeak involved 400 Hereford weaners that had been on irrigated clover pastures for three months. This group had been given free access to a 1 to 15 phenothiazine salt lick for three months, but despite this they were becoming thin, scouring and definitely losing condition. Random fecal samples revealed from 400 to 1400 stomach worm eggs per gram of feces. Each weaner was given 20 grams of phenothiazine in capsules and all responded immediately.

As a rule, cattle on these irrigated pastures can be protected by three or four treatments a year although dairy calves may need more frequent treatments.

Phenothiazine in Secondary Parasitism

Five outbreaks of parasitic gastritis, secondary to malnutrition, have been treated with phenothiazine. Three hundred and twenty-six head were involved and the mortality varied from 10 to 20%. All cases were in grade yearling Herefords and occurred in late summer or early fall as is typical of this form of parasitism in California. In three of the five outbreaks cunic mixture had been used with little success and autopsy findings or fecal examinations revealed gross parasitism and malnutrition to be the etiological factors. The surviving cattle were treated with 30 to 50 grams of phenothiazine and satisfactory recovery followed.

In three outbreaks half of the cattle received extra rations of hay and half received extra hay plus phenothiazine. In all cases the response to phenothiazine therapy was so satisfactory that the owners insisted on treating the control cattle.

In one herd, 111 calves were given a prophylactic dose of 20 grams at the time of weaning and 30 grams when they were a year old. This herd had suffered rather severe losses every fall for the past 10 years but, with phenothiazine treatment in spite of a dry fall and poor feed conditions, these cattle were able to withstand the danger period in good condition.

For best prophylactic results, the calves should be treated at the time of weaning and again as yearlings. In addition, it is

advisable to treat all cattle in July before the ranges dry up, and in the late fall before the winter rains start.

Four herds affected with the north coast disease complex described by Britton[1] have been treated with phenothiazine. A total of 119 grade and purebred Guernsey and Jersey calves from four months to one year of age were involved, with a mortality preceding treatment of from 10 to 50%. The survivors were stunted, emaciated, weak, scouring, pot bellied and coughing. Fecal examinations revealed lungworm larvae and stomach worm and ascarid eggs. Calves were given 12 grams each of phenothiazine and yearlings were given 20 grams. Of 100 head so treated, only four calves failed to recover and these had overwhelming lungworm invasions with secondary pneumonia. On the other hand, of 25 untreated calves left as controls, only five survived until they were yearlings. Obviously these calves are badly stunted and no amount of anthelmintic medication can affect a complete cure once the clinical picture has become established.

When used prophylactically along with better management practices, phenothiazine can be relied upon to prevent the more serious clinical aspects of this condition. In this type of outbreak, treatment of the calves every three or four months constitutes an effective prophylactic measure.

Discussion

The results obtained with phenothiazine in the treatment of parasitic gastritis reported in this paper confirm the effectiveness claimed for the drug by Swanson and Carlisle,[10] Stewart and Crofton,[8] and others in clinical outbreaks. It would appear that smaller doses than generally recommended are effective in controlling the disease. Fortunately, cattle are nearly as tolerant as sheep to any toxic effects which the drug may possess, hence the question of accurate dosage becomes simply a matter of economy rather than safety. Roberts[6] reported anorexia, incoordination and diarrhea for four days in a four-months-old calf which received 45 grams; and constipation, weakness, incoordination and anorexia for three days in three calves receiving 0.5gm to 0.8gm per pound of body weight. Swanson and Carlisle[10] reported incoordination lasting 24 hours in a few weak young calves receiving 40 grams. Finally, Taylor and Sanderson[12] apparently killed a 105-pound calf with a dose of 85 grams. It will be noted that these cases in all of which toxic effects occurred, followed doses from 3 to 6 times as large as those found to be satisfactory for similar calves under California conditions.

A convenient method of determining dosage is to tightly fill a half-ounce capsule for calves, an ounce capsule for cattle 12-16 months of age, and an ounce-and-a-half

capsule for older cattle. These capsules hold 12, 25, and 40 grams respectively.

In these trials the superiority of phenothiazine over cunic mixture in the control of bovine parasitic gastritis adequately confirms the previous work of Stewart and Crofton,[8] and Porter, *et al.*[5] The former demonstrated that in winter trichostrongylosis of yearling cattle, a condition similar to range parasitism in California, phenothiazine produced an average gain of 21 pounds in six months against an average loss of 16 pounds in cattle receiving cunic and an average loss of 71 pounds in untreated controls. These were similar cattle kept on maintenance rations. Porter *et al*[5] also found phenothiazine to be more effective than cunic and in addition reported that phenothiazine increased the packed red blood cell volume an average of 2.3%, whereas similar cattle treated with cunic showed a reduced cell volume of 1.8% and untreated controls showed a reduced cell volume of 1.1%. In their hands as in the California outbreaks herein reported, cunic failed miserably in heavy infections.

Summary

1. Parasitic gastritis is discussed as it occurs in California cattle.

2. For clinical recovery doses of 12-15 grams of phenothiazine for calves, and 20-30 grams for yearlings are sufficient.

3. In these dosages phenothiazine is nontoxic for cattle.

4. Therapeutic and prophylactic treatment of cattle with phenothiazine is discussed.

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In Sweden, as early as 1931, a royal decree was promulgated regarding eradication of the ox warble fly. The decree required that early in the spring, before cattle were put on pasture, the owners should free their cattle of larva in the subcutaneous tissues of the back. It was necessary that the animals pass inspection by a properly designated inspector before being turned out to graze in the spring.

* * * *

John P. Willman and Donald W. Baker of the New York station (Cornell) reported that the value of phenothiazine for the control of the adult nodular worm in sheep had been demonstrated in tests they have conducted. They stated that a control program which involves the use of phenothiazine given as a drench before the grazing season and after the sheep are brought in from pasture in the fall, combined with the use of a phenothiazine salt lick during the pasture season, should eventually bring nodular disease under control. However, their work indicates that eradication cannot be expected within the first year.—*The Sheepman.*

* * * *

To Resist Change is to Become Outmoded

Nothing in life, not even taxes, seems so certain as change. There are men now living who have seen the oxcart and the "China Clipper"; the covered wagon, the modern automobile and the streamlined train; the flail and the threshing machine; the cradle and the combine; the pony express and the radio. Everywhere in industry, in agriculture, in transportation, in communication, the inevitable law of progress is operating. The history of the last half century is a record of kaleidoscopic change, and the individual or the institution that has ignored them has become outdistanced, speedily and hopelessly, in the race we call progress. There have been innumerable such individuals and institutions. Veterinary medicine must maintain its place in onrushing progress or suffer the fate of all laggards. War stimulates the application of scientific discovery, accelerates change and revolutionizes customs. Peoples do not go back to the old after wars.

The Use of Sulfa Drugs in Veterinary Practice*

By W. R. KRILL**
Columbus, Ohio

THE introduction of the various sulfa compounds to the medical world for the control of different types of infection promises to rank with the major advances of medical science. The miraculous cures of these drugs have been highly publicized both in popular and medical literature, so that one often wonders how peoples and animals survived prior to their discoveries. The lay publicity has resulted in clients feeling cheated if sulfa drugs are not prescribed for all conditions we are called to medicate and, as is common with the advent of all new drugs, the sulfa drugs are being used injudiciously in many instances for conditions for which they were never intended and in some cases for lack of proper diagnosis, they are used in the hope that they will bring about a cure. Also in many cases they are being used as a substitute for careful surgery. However, in spite of these abuses, the sulfonamide compounds have proved their position as among the greatest therapeutic agents of all times. The annals of our present medical war history will reveal the part which these drugs have played in controlling severe wound infections and thus saving the lives of thousands of our fighting men.

Sulfanilamide, the first of this group of drugs to come into general prominence, was first synthesized in the year 1908. However, its usefulness in the treatment of disease was not recognized until almost thirty years later. About 1933 a product known as prontosil (now known as neo-prontosil) was placed on the market, the active principle of which was later found to be sulfanilamide covered by a powerful dye to confuse and make difficult its detection, and was later found to be of specific value in the treatment of streptococcic diseases. Shortly afterwards, the use of sulfanilamide as a therapeutic agent was definitely established. Since then a number of the sulfonamides have been synthesized, with the definite possibility that there are many more yet to come. From the original discovery of the value of neo-prontosil and sulfanilamide as an anti-streptococcic agent, we now know that the sulfonamide group of chemicals are of value as prophylactic agents for the treatment of a variety of diseases due to a rather wide variety of organisms.

In a consideration of the sulfonamides, we should remember that these agents are largely bacteriostatic in their action: holding the infective agents in check until the defense mechanisms of the body are able to remove or bring the infective bacteria under control. Just how this bacteriostatic process is accomplished is a matter of some controversy, however, it is generally thought that, as a result of a low concentration of these drugs, the enzymes secreted by the bacteria upon which they depend for their supply of oxygen, are destroyed, and thus a condition of oxygen starvation results. However, in cases of high concentration of the drug, in contact with infections, over a

While many marvelous cures have resulted from the use of sulfa drugs used judiciously, their employment may be fraught with danger. Deaths have resulted from damage done by certain of the compounds, sometimes due to idiosyncrasies of the patient but more often to lack of experience or care on the part of the clinician. . . . However, with reasonable care in dosage and duration of treatments, veterinarians, in general, seem to have reported few, serious, untoward effects.—*Bourne.*

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*Presented at meeting of Illinois Veterinary Medical Association, Jan. 20-21, 1944.

rather long period of time such as could be obtained in topical application, these drugs may exert a definite bactericidal action. The efficacy of the sulfa drugs is greatly reduced in the presence of para-aminobenzoic acid. Since this substance is found in considerable quantities in all infected wounds and tissue necrosis, a thorough cleansing and débridement of such wounds is absolutely necessary, if beneficial action of the sulfa drugs is to be expected. It should therefore be kept in mind that these drugs are to be regarded as a valuable aid but not a substitute for good wound treatment.

Sulfanilamide

Of all the sulfonamides, this is the one most widely used in veterinary practice, especially in the treatment of the larger animals. The cost of many of the other sulfa drugs is still somewhat prohibitive and many are not yet available in sufficient quantities for veterinary use. When administered orally, the drug is absorbed quite rapidly and maximum blood concentration can be obtained within four to six hours. The drug is eliminated largely through the kidneys and in order to maintain blood levels the drug should be administered at about six hour intervals. For more rapid action the administration of neo-prontosil intramuscularly in several different locations followed by oral administration of the drug may be used. Internally the drug is of great value in the treatment of strangles and mixed infections of horses such as are commonly encountered around stockyards and sales barns. When given in early cases of strangles the disease may be aborted and in most all cases formation of abscesses is held to a minimum. Internal medication is also recommended in conjunction with topical application as a prophylaxis against septicemias resulting from severe wound infection. In cattle, sulfanilamide is commonly administered orally in the treatment of acute cases of mastitis with high temperatures resulting from streptococcic infection. Its action in these cases, in so far as reducing the temperature and correcting the general systemic reactions, are quite marvelous. However, it must be remembered that it has been definitely established that mastitis cannot be cured by oral administration of the drug.

Sulfanilamide has also been used extensively in the past for the treatment of pneumonia and shipping fever of cattle, although in recent years it has been largely replaced with sulfapyridine and sulfathiazole.

The dosage of sulfanilamide used by practitioners for internal medication is quite variable. However, most authorities recommend a rather large initial dose, of about one-half to two-thirds the daily dose, followed by about 1 gr. per pound weight daily divided in four equal doses, for a period of two to three days, after which it may be reduced by one-half. In mild cases of infection much smaller doses may give excellent results, however, in severe infection the larger doses are to be desired.

For local application, sulfanilamide is of particular value in the treatment of wounds and fractures.

Key[1] reports favorable results in the use of sulfanilamide in the treatment of contaminated compound fractures after careful débridement. The powder must be liberally sprinkled over all parts of the wound, but an excess may cause drainage. Contaminated wounds which can be treated not later than ten hours after their occurrence are closed tightly and generally heal without infection. Key admits that such results were often possible before the advent of the sulfonamides but he believes a favorable outcome is more frequent when these drugs are used. He now uses either sulfanilamide or sulfathiazole powder in all cases of orthopedic surgery whether clean or contaminated and in a series of 250 cases has not had a single case of infection.

Campbell and Smith,[2] and Thomson,[3] confirm these results and recommend the use of 15-20 grams of sulfanilamide powder in compound fracture wounds after fixation of the bones had been accomplished. The wounds are closed without drainage and twenty-four hours later internal medication is begun. Thomson gives as his sixth commandment for the treatment of compound fractures "coat the wound with sulfanilamide or one of its derivatives." The use of sulfanilamide is recommended in

surgery in animals, especially on the farm where aseptic surgery is not always possible. This should not be construed as a substitute for observing careful surgical procedures, however we must recognize that hospital asepsis is not always possible under farm conditions. Then in such conditions as puncture wounds of the abdominal and pleural cavities, tendon sheaths and joint capsules, the introduction of sulfanilamide followed by oral medication is definitely indicated. Farquharson and Smith have implanted two grains per pound weight intraperitoneally in dogs without adhesions or other evidence of infection.

The use of homogenized sulfanilamide in oil for intramammary injection as reported by Kakavas, Palmer, Hay and Biddle[6] is being used quite extensively at the present time as a treatment for steptococcic mastitis. They recommend the injection of 40-80cc of an approximate 38% suspension of sulfanilamide in mineral oil into the affected quarters. These workers report cures in 94.7% of the infected quarters. While this type of medication is recommended by the authors for acute flareups of mastitis, in our experience, it has had little value and may actually be contra-indicated. While all such udder infusions have value in freeing the udder of mastitis organisms, we should not be mislead into believing that we now have the final answer to the mastitis problem.

In so far as I have been able to learn the toxic effect of the sulfa drugs are of minor concern in our veterinary practice. However, we should not overlook the possibilities of tissue damage, particularly in the kidney, which may not be recognized. In human medicine there are many idiosyncrasies encountered in sulfonamide therapy. Central nervous involvement such as headaches, dizziness and psychic disturbances are quite common. Cyanosis, dermatitis, acidosis, leukopenia, hemolytic anemia, nausea and vomiting have been observed. And in some cases severe nephritis and complete oliguria has occurred. In all cases in humans, in order to prevent kidney irritation and crystallization of the drug in the tubules, large quantities of water are prescribed and alkaline medication is advised.

Sulfathiazole

Sulfathiazole is one of the more widely used sulfonamides. In human medicine it has been found to be particularly effective against pneumococci, staphylococci, gonococci, as a urinary antiseptic and in certain types of tissue infections. It is not as effective as sulfanilamide against hemolytic streptococci and is often used alone or in combination with sulfanilamide in wound treatment. Reports in human medication indicate that the drug is less toxic than either sulfanilamide or sulfapyridine. It is more readily absorbed and is also more rapidly eliminated than either of these drugs and therefore requires more frequent dosing. The dosage is similar to sulfanilamide: about one grain per pound weight daily. For the treatment of pneumonia in cattle especially and in swine, sulfathiazole is very effective.

Pepper and Ham[5] in using sulfathiazole on 52 cases of respiratory infection in humans feel that this drug is equally effective to sulfapyridine in the treatment of pneumonia. Slightly larger doses of sulfathiazole are required and it was noted that the temperature did not return to normal quite as rapidly. In both drugs the greatest danger appears to lie in the re-crystallization of the free or more frequently the acetylated form within the urinary passages. However, in the majority of cases it is possible to control the crystalluria by increasing the fluid intake and by giving sodium bi-carbonate or sodium lactate.

Sensitivity to sulfathiazole particularly, and in a lesser degree to the other sulfonamides, after prolonged dosage (9 days or longer), or to readministration of the drug after an interval of time has elapsed, has been commonly observed in humans. This sensitivity is manifested in the form of marked febrile reactions, chills and psychosis. To my knowledge these observations have not been reported in veterinary literature.

In 5% ointment form the drug is used for the treatment of conjunctivitis, burns, some cases of dermatitis, ear infection, etc.

Sulfapyridine

This is the second member of the sulfa group to come into rather wide usage. This drug was found to be particularly valuable in the control of the staphylococci, meningococci and pneumococci. In veterinary medicine sulfapyridine has been used extensively in the treatment of pneumonia, especially in calves, with remarkable results, when the treatment is started early. The dosage commonly used for calves is one-half grain per pound weight with a decrease of about one-half on the second day. In older calves, where the fore stomachs have developed the dosage can be increased to one grain per pound weight daily.

The use of the sodium salt of sulfapyridine used intravenously in the dosage of 45 grains per 100 pounds body weight followed by supportive oral administration of one grain per pound weight per day for two or three days, is regarded by Farquharson[4] as specific in the treatment of calf diphtheria. In human medicine sulfapyridine has lost much of its popularity with the advent of some of the newer drugs such as sulfathiazole and sulfamerizine, which have been proved to be equally effective and in some instances more effective against the infection for which sulfapyridine had formerly been used, yet did not produce the toxic symptoms of sulfapyridine.

Sulfadiazine

This drug is a more recent addition to the sulfa group, which has not been used to any extent in the veterinary field, due no doubt to the fact that the cost is still quite prohibitive for general veterinary use. Its value in the treatment of staphylococcus and pneumococcus infections in man has been definitely established. The drug has a rather high efficiency against hemolytic streptococcic infection also. Since it is more easily excreted by the kidneys than either sulfathiazole or sulfapyridine it rates quite highly as a urinary antiseptic. Its use for local application in the treatment of burns is described by Pickrell.[7] The burned areas are sprayed with 3% sulfadiazine in 8% triethanolamine; every hour during the first day, every two hours the second day, every three hours the third day and every four hours the fourth day. This treatment seemed to allay pain to such an extent that the use of narcosis could be dispensed with. At the John Hopkins Hospital this treatment has proved most satisfactory and is used in the treatment of all burns. While the drug is generally regarded as less toxic than any of the other previously mentioned sulfa drugs, Talbot and Adcock[8] report a sensitivity to prolonged dosage, and to readministration after the lapse of an interval of time.

This drug should be a valuable addition to veterinary medication, once the price comes within reason to permit its being used more widely.

Sulfasuxidine

A sulfa drug whose value is largely that of a bacteriostatic agent in the intestinal tract is sulfasuxidine. Because of the low absorptive rate, this drug is regarded as the least toxic of all the sulfonamide drugs. In our small animal clinic it has been used quite extensively in the treatment of intestinal infections and has given very favorable results. Several investigators have reported favorably in the use of sulfasuxidine in the treatment of calf scours. Herriott[10] reporting on its use in several herds where calf scours had been a problem, states that results of his study would indicate that sulfasuxidine was an effective agent for the prevention and treatment of calf scours. Approximately one gram per kilogram body weight was used as a daily dose. Other reports likewise indicate that sulfasuxidine may have a definite place in the prevention and control of calf scours, once the drug becomes more readily available for veterinary usage.

Bryan[11] advises doses of 10 grains per day for cats; 15 to 20 grains for small dogs and 60 grains daily for the larger breeds. These doses are divided and administered in four to six equal doses at regular intervals throughout the day. He found the drug to be particularly valuable in the treatment of dysenteries of puppies. The drug was also found to be useful in controlling bacillary dysenteries and the treatment of food poisoning in dogs. In severe intestinal infection, much larger doses may be given without harmful results.

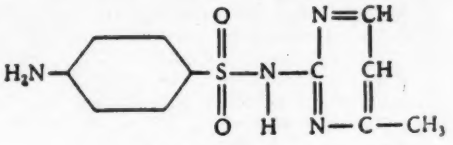
Sulfaguanidine

This drug is used primarily in the treatment of enteric infections. While the drug dissolves quite readily in the intestinal tract, its absorption from the intestine is quite slow and does not accumulate in the blood and tissue fluids in any appreciable amounts. Sulfaguanidine has been reported to be effective in the treatment of bacillary dysenteries, enteritis and calf scours. Due to its low absorption rate, rather large doses can be given. However, three-fourths to one grain per pound body weight is the dosage ordinarily recommended. Thorpe and Shigley[9] report favorable results in the treatment of 40 cases of calf scours. They recommend 0.15gm to 0.17gm per pound body weight to calves under 75 pounds while calves over 75 pounds receive 0.13gm per pound weight divided into three equal doses. On the third day the dosage should be reduced to one-third. An important observation made by these investigators was that an overdose of sulfaguanidine caused severe damage to the kidneys, manifested by a severe tubular nephritis.

Sulfamerazine

One of the latest of the sulfa drugs to be brought out is a derivative of sulfadiazine. This drug is being widely publicized in human medicine, but its use in veterinary medicine thus far is very limited. The drug is more rapidly and completely absorbed than any of the other sulfa drugs and is more slowly eliminated from the kidney, thus blood concentrations can be maintained with smaller and less frequent dosage. The drug is more soluble in acid and neutral urine and is, therefore, less likely to cause renal obstruction. It readily penetrates the cerebrospinal, pleural and peritoneal fluids. Results in human medicine indicate that sulfamerazine is particularly valuable in the treatment of pneumococcus, streptococcus and meningococcus infections. Its value against staphylococcus infection is not equal to sulfathiazole. If all advance reports are true, this drug may prove the most popular of all the sulfa drugs thus far available.

Judging from the progress to date, the future development of newer and better sulfonamide compounds seems a distinct possibility. Those available to date have definitely established themselves or show promise of being invaluable in the treatment of animal disease. However, we should constantly bear in mind, that each of these drugs has its limitations and must be judi-



Sulfamerazine
2-sulfanilyl aminomethylpyrimidine

ciously used for the purpose for which it was intended. Furthermore, we should be cognizant of the fact that all of these drugs have been proved toxic to a greater or less extent in human medicine and while the toxic effects and tissue damage, especially in the kidneys may not be as apparent in animals, it is reasonable to suppose that they do occur and may be a factor to reckon with at some future time. In reviewing the literature it is interesting to note the importance attached to fluid therapy and increasing the fluid intake in conjunction with sulfonamide medication in human medicine. Yet little or no mention is made of this in the literature relative to veterinary sulfonamide medication. It would seem that this should possibly be given more consideration. Furthermore, we should remember that the sulfonamides are not to be regarded as a "cure all" and are not to be used as a substitute for careful examination and diagnosis. The value of the sulfonamides have definitely been established in the treatment of all classes of wounds, and in conjunction with many of our surgical procedures. However, we must not regard their use as a substitute for careful aseptic surgery. The same careful procedures in wound treatment and strict aseptic surgical technique must still be practiced in order to be successful. Let us rather regard the use of these drugs in our surgical procedures as an added weapon to insure the success of our efforts.

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Graduate Training

It is only in practice and in municipal food inspection, possibly also in regulatory work, that the graduate in veterinary medicine is thrown in over his depth and left to sink or swim by his own efforts. In the other lines of veterinary work the fledgling graduate is given a period of carefully supervised training. The medical profession has long recognized this difficulty of transition from student to professional man. They have endeavored to solve it by a system of internship, which the veterinary profession does not have. The young medical student must spend at least one, and in better schools, two years as an intern in a hospital where he engages in professional duties similar to those he will meet later in the practice of his profession; and in the performance of these duties he is carefully supervised by the hospital staff. The plan has not always been satisfactory and the medical profession has evolved an elaborate set of rules that a hospital must observe before it is acceptable for training interns; the facilities of the hospital, the staff, the laboratory, the equipment, the character of its work are all subject to inquiry by the organized medical profession and must meet requirements so rigid that some hospitals are not inclined to undertake it.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Influenza Vaccine 69% Effective

The Army tested a new influenza vaccine on 6263 cadets in the Army Specialized Training Program at eight universities. The controls numbered 6211. In the mild influenza epidemic in November, 1943, 2.22% of the men who were vaccinated and 7.11% of the unvaccinated, contracted the disease.

Treating Sheep for Stomach Worms in Australia

The great value of phenothiazine in controlling outbreaks was shown, and the shortcomings of carbon tetrachloride and copper sulfate-nicotine mixture were demonstrated. Successful control of haemonchosis under outbreak conditions requires repeated treatments. Anthelmintics which depend for their efficiency upon copper sulfate bringing about direct passage into the abomasum should be alternated with carbon tetrachloride.—*Animal Pathology Exchange*, University of Illinois.

Calf Scours

In calves suffering from infectious diarrhea (white scours, calf scours), sulfaguanidine exerts an inhibitory effect upon coliform organisms of the intestinal tract and, by controlling the diarrhea, shortens the course of the disease and effects recovery in a high percentage of cases, according to Thorp and Shigley. The clinical symptoms usually subside in three to four days.

The dose suggested for calves 75 to 100 pounds and over is approximately 0.15gm per pound body weight, per day, preferably divided into two or three equal parts and given morning, noon, and night. On the third day, the dose should be reduced to 0.10gm, and on the fourth day and thereafter, to 0.05gm per pound body weight.

Eradication of Swine Brucellosis in a College Herd

By H. C. Smith
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IN 1941, one of the Oklahoma A. & M. College herds of swine became infected with *Brucella suis*. Over a period of two years, some abortions had occurred in this herd but they were not considered serious. The authors began testing this herd (both boars and sows) every 30 days in the fall of 1941. The animals reacting positively to the agglutination test in dilutions of 1 to 50 or higher were removed. After nine months it was felt that little progress was being made because a few more animals were removed at each test. The testing interval was shortened to 15 days and all animals giving a positive agglutination in dilution as low as 1 to 25 were removed. The first test on the new plan removed many of the older sows which had not been detected by the higher dilution and four of the best breeding boars that the College owned. The reacting sows were sold immediately. The boars were castrated, isolated and later sold as stags. Four weeks and six weeks, respectively, following castration, these animals were again bled and tested. At this time a negative test was obtained in dilutions of 1 to 25. From June 1, 1942, to July 1, 1943, this herd was tested every 15 days; all animals reacting positively in dilution of 1 to 25 or higher were removed. By this time all of the original animals had been removed from the herd, because of positive blood tests and the disease was eradicated—so was the herd.

One sow in the College herd had aborted as a gilt. She gave a positive blood test shortly afterward. Since she was a superior individual, that had been shown at the state and many of the county fairs she was not disposed of, but was removed to a nearby farm. She has given birth to three consecutive litters of normal, full-time pigs, although she continues to be blood positive. One-half of her offspring became positive when they became sexually mature. Such animals may, however, make good breeding stock as they may have sufficient resistance to the infection to prevent abortion. However there is the possibility that gilts farrowed by reacting dams may themselves react when they reach sexual maturity.

It is considered, by many, that the enlargement of one of the testicles is the most important symptom of brucellosis in the male. It was rather hard to determine which organ was the larger in many of these animals. It seemed apparent that size alone is not an index to the presence or absence of Brucella infection.

The most important symptoms we observed were:

1. Sterility.
2. Soreness.
3. Lack of willingness to serve the sow.

Some of these boars would refuse to serve a sow even though the pair were turned in a small pen by themselves. The cause of such a failure on the part of the boars may of course be due to arthritis of any of the joints—usually the fetlock or pastern. They refuse to eat and some may have an elevation of temperature.

We noted another lesion that was rather

constant. When these animals were castrated the tunic was usually adherent to the testicle and was difficult to strip off.

Transmission

It is our opinion, based on study of this herd, that the boar is the most important disseminator of the infection. Direct contact with contaminated material, which is usually excreted by the sow, is also important. Infection by ingestion of food and water contaminated with the organisms is also to be considered.

The Tests

All agglutination tests were conducted by the rapid method, using antigen produced and furnished by the federal Bureau of Animal Industry. All blood samples were submitted to the Pathological Division of this Bureau for confirmation of our tests.

Vaccination

In one herd, aside from that maintained by the College, consisting of 128 adult gilts, sows and boars, blood test indicated a 25% infection.

An autogenous bacterin was prepared, using the *Brucella suis*, a streptocci, *Corynebacterium pyogenes* and *Staphlococci albus* and *aureus*. All animals were vaccinated three times at ten-day intervals with 5cc of this bacterin. This was done before the animals were bred. The results were not satisfactory. We came to the conclusion that had the positive boars been removed, the results might have been better.

Conclusions

1. The test and slaughter method of eradication is the most satisfactory procedure at the present time.

2. All animals reacting in dilution of 1 to 25 should be eliminated from the breeding herd.

3. Frequent testing is imperative.

4. Swine under six months of age as a rule do not give a positive blood reaction even though they are born to a positive sire and dam.

5. Swine do not give positive blood reactions until they become sexually mature.

6. Abortions in a herd of breeding swine may also occur as a result of causes other than brucellosis.

Control of Trichinosis

The National Institute of Health in 1943 carried on and completed an outstanding continued study of the epidemiology of trichinosis leading to demonstration of the widespread prevalence of this infection in the United States and proposals for its control.—*OWI.*

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Vitamins A and D have long been obtained from the livers of cod and other fish, but other vitamins contained therein have been wasted. A patent has been issued by which the water soluble vitamins C and some of the B may be saved. By mixing the minced livers with a pectin-containing substance the water in the liver and the vitamins it contains are held in this solution.

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STAMPS AND BONDS

The exact functions of vitamin D in the animal body have not been fully worked out. However, there is much evidence to indicate that this factor plays an important part in many body functions besides bone growth.

Various studies have shown a relationship between vitamin D and the energy exchange of the body. There is a lowering of the basal metabolic rate in vitamin D deficiency. In normal subjects the administration of vitamin D has been found to increase the metabolic rate.—*Vitamin D Digest.*

* * * *

Be Slow to Advise Killing an Ailing Animal

Veterinarians must never lose sight of the fact that the primary function of the medical man is to cure. Killing an animal is a confession of failure. Much more can be accomplished by prevention than by therapy. Nevertheless our reputations as veterinarians, civil or military, depend far more upon the few that we cure than upon the many that we may prevent from becoming ill. But the opportunity to practice preventive medicine depends upon our ability in curative medicine. Opportunities for the latter must not be neglected or we shall lose the chance at the former.

Sulfamethazine Treatment of Cecal Coccidiosis*†

Until last year no drug was available for the treatment of coccidiosis in chickens. Horton-Smith and Taylor (1942) demonstrated that 2% sulfamethazine[1] in the mash prevented the development of symptoms in birds infected with *Eimeria tenella* when administered 96 hours after infection. Horton-Smith and Taylor (1943) also showed that a saturated solution of sulfamethazine substituted for the drinking water was efficacious in the treatment of cecal coccidiosis, treatment being instituted after the symptoms appeared.

Experimental

Four-week-old White Leghorn chicks, supplied by the poultry husbandry department of this station, were divided into three groups of 25 each. These served respectively as (1) uninfected controls, (2) infected untreated controls, and (3) infected sulfamethazine treated birds. The latter two groups of birds were infected by placing equal amounts of a suspension of sporulated oöcysts of *E. tenella* in the mash. The birds were weighed one week before infection and thereafter at weekly intervals. Treatment was instituted when the first blood was noted in the droppings; this was 98 hours after infection. At this time a saturated solution of sulfamethazine was substituted for the drinking water.

TABLE I—AVERAGE WEIGHTS IN GRAMS

Date	Uninfected Controls	Infected Untreated Controls	Infected Sulfamethazine Treated
August 12	169	166	168
August 21	271	249*	274*
August 28	333	245	277
September 2	396	250	332

*Day infected with *Eimeria tenella*.

TABLE II—MORTALITY

Date	Uninfected Controls	Infected Untreated Controls	Infected Sulfamethazine Treated
August 25	...	...	...*
August 26	...	1	...
August 27	...	17	4
August 28	...	3	2
August 29	...	...	...
August 30	...	...	...
August 31	...	...	...†
September 1	...	...	...
September 2	...	1	...
Total	0	22	6
Percent	0	88%	24%

*Treatment started 5:00 p. m., Aug. 25, after the first bloody droppings.
†Treatment stopped 5:00 p. m., Aug. 31.

Results and Discussion

The results of this treatment are given in Tables 1 and 2. The response of the infected birds to sulfamethazine was marked. From the clinical symptoms these birds were as severely affected as the controls. There was marked hemorrhage five and six days after infection, and the resultant anemia and droopiness was comparable to that of the control birds. However, the treated birds started eating again and showed greatly increased vigor, while the controls were still exhibiting the characteristic symptoms of cecal coccidiosis.—*Philip A. Hawkins.*

References

Horton-Smith, C., and E. L. Taylor, 1942. Sulfamethazine and sulfadiazine treatment in caecal coccidiosis in chickens. *Vet. Rec.*, 54: 516.

Horton-Smith, C., and E. L. Taylor, 1943. Saturated solution of sulfamethazine as a substitute for drinking water in the treatment of cecal coccidiosis in chickens—a preliminary note. *Vet. Rec.*, 55:109-110.

*Published by permission of the director of the Michigan Agricultural Experiment Station.
†Reprinted from *Poultry Sci.*, 22:6, p. 459.
[1] Sulfamethazine was kindly supplied by Parke, Davis and Company, Detroit, Michigan.

Veterinary Subsidy!

The Province of Alberta permits municipalities to appropriate a bonus for physicians who locate where a good living from private practice could not be earned. The amount of the bonus varies according to the prospect of earning a living from private clinical work. Something of the same sort seems necessary for veterinarians in parts of our great livestock country in order that the whole people may be protected against the ravages of costly diseases which spread far and wide from centers where a veterinarian cannot make a living from private practice. It would further provide the owners of animals with veterinary service when needed to aid in the conservation of private property. The cost of the subsidies would be trivial compared to the benefit the nation would derive from a better control of infectious diseases of animals, which at present are some of the chief limiting factors in animal production and cost of foods of animal origin.

Synthetic Vitamin K and Thrombosis of Veins After Injury in Dogs

By H. J. MOSTYN
New York City

DAM, in 1929, and in 1943, suggested a relationship of hemorrhagic diathesis to a deficiency of the fat-soluble vitamin K. This stimulated great interest in this new substance (vitamin K). This vitamin appears to be a constituent of plasma prothrombin which is involved in the mechanism of the clotting of the blood. In animals, prolongation of the prothrombin time with accompanying bleeding has been observed in chicks after the withdrawal of this vitamin from the diet. Such a condition is also produced in cattle suffering from sweet clover disease. Doisy and his associates have been mainly responsible for the synthesis of vitamin K, the compound being 2-methyl-3-phytyl-1,4-napthoquinone.

So far, no observer has reported an increased incidence of thrombosis or thrombophlebitis with human patients treated with vitamin K. An experimental study was instituted early in 1943 at the University of Virginia School of Medicine and was supervised by Morton, Shearburn and Burger.

The plan devised was to traumatize mechanically the leg veins of two groups of dogs. The experimental group (27 dogs), composed of mongrel dogs weighing nine to 44 pounds, were fed, in addition to a normal diet, 3mg of vitamin K per dog per day during the entire experiment. The control group (25 dogs) received the normal diet alone. Prothrombin determinations by the Quick method as well as hematocrit determination were made on all dogs before the start of the investigation and again at the end of one week. In some animals clotting time was determined by placing about 1cc of venous blood gently in a glass-stoppered weighing dish and recording the time of clot formation. On the eighth day, the radial and saphenous veins of the four legs of both the experimental and control groups of dogs were treated in the following manner. Pressure was applied to the limb proximally to engorge the vessel. A No. 15 intravenous needle was introduced well into the lumen of the vein after which a No. 22 spinal needle with a slight "hook" on the tip was inserted through the larger needle farther into the vein. The vein was then collapsed by releasing the pressure and both needles withdrawn together by a rotary motion so as to tear slightly the intima throughout (approximately 6 to 8cm of the length of the vessel). The amount of trauma in all instances was made as uniform as possible.

Under general anesthesia with pentobarbital sodium* (1cc per 5 pounds), given intraperitoneally and intravenously at approximately 48 hours after the traumatism was produced, the veins were removed by surgical excision from 10 controls and also from 10 dogs previously treated with synthetic vitamin K. Care was taken to avoid trauma at the time of removal of the veins; at 96 hours veins were removed from the legs of 15 of the control group and from 17 of the vitamin K treated group.

Intravenous injection of anesthesia

*Nembutal (veterinary pentobarbital sodium).

Results

In some instances the initial venipuncture was unsatisfactory and consequently these vessels were not included in the study. The stained sections of all veins were studied alone by a pathologist who in no instance knew whether he was dealing with control or experimental material. Only those vessels showing subtotal or total occlusion of the lumen were adjudged thrombosed. Some veins had a minimal amount of fibrin deposited at the puncture site and were excluded from the group of thrombosed veins. There was no significant difference between the incidence of thrombosis in the animals at 48 and 96 hours after trauma that could be observed.

The incidence of thrombosis in the animals which were used as controls was 29 out of 89 veins—33%. In the group treated with vitamin K there were 37 out of 97 veins—38%.

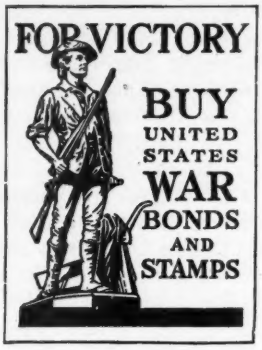
The slight difference in the incidence of thrombosis between the control and experimental groups is probably of no significance. The thromboplastin, calcium and fibrinogen factors which are essential to the clotting process were presumably equal in the two groups, and the prothrombin factor was found to have essentially the same normal value in both the control and the vitamin K groups before and after the feeding of vitamin K. Prothrombin times, hematocrit determinations and clotting times were made in each animal, at intervals, without any demonstrable effect of synthetic vitamin K administration.

* * * *

Small-Animal Practice Antedates Dairy Practice

During the 1834 session of the veterinary school at Alfort, France, 570 animals were admitted to the infirmary—382 horses, 5 asses, 1 goat and 182 dogs. In the same year, 950 animals were admitted to the infirmary of the veterinary school at Lyon, France—430 horses, 36 asses and mules, 1 cow, 5 goats, and 464 dogs and cats. The remainder comprised an ape, a coot, a wolf, a squirrel and other animals less common.

Thirteen mineral elements are regarded as essential to animal life: calcium, phosphorus, sodium, potassium, sulfur, chlorine, magnesium, copper, iron, iodine, manganese, cebalt and zinc.



Management of Dystocia in the Dog

The first thing to do in a case of dystocia is to consider the general condition of the bitch. Any rise in temperature is ominous of a toxic state arising from the uterus, and means that unless delivery can be effected by the genital passage, hope of saving the life of the bitch is very slender. If the temperature is normal and no previous vaginal examination has been made, the greatest care must be taken to protect the uterus from infection in carrying out manipulation, so that if we fail to empty it we can resort to abdominal section with a reasonable hope of a successful termination.

The handling of a case of dystocia is a surgical operation and the same care should be taken to prevent infection of the normally sterile uterus by pathogenic organisms as would be taken in carrying out an operation elsewhere in the body. Every digital examination *per vaginam*, even with the greatest possible regard for surgical cleanliness, is fraught with some degree of danger of infecting the uterine cavity. The risks are not very great when it is possible to effect delivery by the genital passage, but until a vaginal examination is made, we cannot usually tell whether we are likely to succeed in this way or not or whether abdominal section is indicated.—*W. McG. Mitchell* in *The Veterinary Record*.

Clinical Reports

Ocular Tumors in Cattle

Tumors of the eye, usually malignant, are quite common in cattle. The symptoms give a fair idea of whether or not the tumor is malignant. When there is swelling of the surrounding tissue, a breaking down of the tumor, a discharge of pus and angry granular swelling, we expect malignancy and particularly is this true if the tumor is on the membrane nictitans.

Ophthalmic tumors are more common and more prone to be malignant in Herefords than in other breeds. But today I was called to treat a tumor in the eye of a Holstein, one of a fine herd at the Indiana State Farm. It had every appearance of being malignant but upon careful examination I found a cocklebur imbedded on the outside of the nictitans deep down under the orbit and completely out of sight. Needless to say preparations for removal of the third eyelid ceased right then. The eyeball was unaffected and I believe the animal will make a good recovery.

T. A. SIGLER

Greencastle, Ind.

Ice for Febrifuge in Hemorrhagic Septicemia

For more than 20 years I have used ice packs in the treatment of all cases of hemorrhagic septicemia accompanied by pyrexia. That is, in all cases that I deem it worthwhile to treat. My results have been highly satisfactory.

My practice, when called into an outbreak of hemorrhagic septicemia, is to:

1. Separate the obviously sick animals from the remainder of the herd and place them in individual enclosures.

2. Vaccinate all animals in the herd using 5cc of hemorrhagic septicemia bacterin.

3. Take the temperatures of all animals in the herd and apply ice packs to all having temperatures three degrees or more above normal. The ice is applied by putting about 12 quarts of finely crushed ice in a burlap sack, spreading it evenly, placing it on the animal's back, covering with a blanket and strapping securely in place.

The owner is instructed to take the temperature of all members of the herd three times daily and apply the ice pack to any, the temperature of which goes more than three degrees above normal.

The temperature usually falls to normal in three or four hours and the animals begin eating and ruminating.

I have had no success in treating cases where the animal grunts on inspiration and expiration, holds the chest fixed and can be induced to move only with difficulty. Many necropsies on such cases have convinced me that at this stage the damage to the lungs is irreparable and treatment therefore is useless.

G. F. YAGER

Sauk Centre, Minn.

Acute Prostatitis in a Coon-Hound

The patient, a four and one-half year old male coonhound was presented to me with the following history: Two weeks previously he had suddenly showed evidence of pain, lost the use of his legs and rapidly became paralyzed. The dog was taken to several veterinarians for treatment and a number of different diagnoses were made, according to the owner of the dog. One believed that the dog had been struck by a car in spite of the owner's protestations that he had seen the animal stricken. Another thought that it was a nutritional deficiency, and a third thought that heart worm might be the cause. Euthanasia was recommended by all.

Physical examination showed that the dog was unable to move, except the end of his tail, his eyes and his ears. He was able to eat when his head was held up and food placed at his nose. The temperature was normal and the pulse weak. An electric shock was applied to the extremities and although the reflexes of the legs were absent the dog howled in response to the stimuli. External palpation revealed no abnormal characteristics.

The heart worm diagnosis held our attention as the most likely possiblity so samples of blood were drawn. However, examination of eight different slides for the presence of microfilaria proved negative. A

blood count showed 4,650,000 erythrocytes, which is in the lower range of the norm. The white cell count on the other hand was 21,000. Rectal palpation revealed an enormously enlarged prostate gland. It was almost as large as a baseball. This seemed to indicate an acute prostatitis.

For the collapse we administered, intravenously, 250cc of 5% dextrose in saline solution twice daily. This was continued for one week, until the dog could raise his head and drink and eat from a pan without help. We also administered 12mg of diethylstilbestrol in oil intramuscularly, every other day for two weeks, and twice weekly thereafter. We thought that this might serve to reduce the size of the gland. After several days there was an abundant discharge of white pus from the prepuce. Sulfathiazole was administered *per os*, at the rate of 70 grains daily, for five days after which 45 grains were given daily for another week.

After three months; over his paralysis and ready for a hunt

The first sign of improvement appeared three days after treatment was commenced. This consisted of a feeble attempt by the dog to raise his head from the floor. At the end of the second week he could hold up his head and maintain a chest position. He then began to move his front feet. From that time recovery was more rapid. At the end of five weeks the dog could move all parts of its body and walk about if support was given to the rear parts. The dog then was sent home and the recovery was uneventful and complete. The illustration shows the final outcome.

HEROLD M. HARTER, JR.
Toledo, Ohio

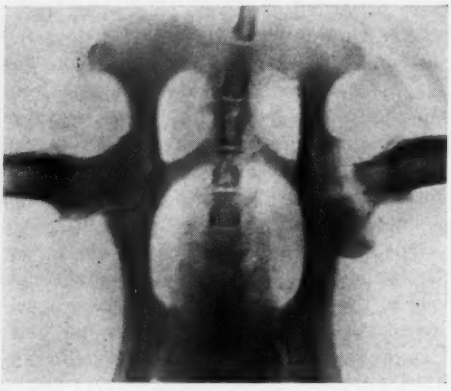
Open Reduction of Fracture of Femurs in Two Dogs

A male cocker spaniel, six months of age, struck by a car three days previously; and an old, male Irish setter of the same age, struck by an auto the preceding night, were presented at the hospital of Dr. B. F. Pfister, Kansas City, for treatment the same morning. Both had suffered a complete detachment of the head of the femur from the shaft. The head had slipped from the acetabulum and was dorso-lateral to the pelvis. In the cocker spaniel adhesions had formed and the head had to be separated from the pelvis before reduction.

The operations in both cases were essentially the same. An X-ray was made previous to the operation and the relative positions of the affected parts can be quite clearly seen in the accompanying illustration.

All instruments and rubber gloves were autoclaved prior to the operation. The anesthesia, administered intravenously, was pentabarbital sodium (nembutal). The cocker spaniel was confined in lateral recumbency and the operative area, about 4½ inches long and 3 inches wide, immediately over the acetabulum and in line with the femur, was shaved and cleansed thoroughly with alcohol, then painted with phemer-nite. The incision, about three inches long, was made over the acetabulum; above and running parallel with the femur; through the skin, subcutaneous tissue and muscles down to the acetabulum and femur. The head of the femur was held rigid and a hole drilled in the small piece of femur which had fractured with the head. The hole started just below the articular surface and extended obliquely to the marrow at the fractured surface. Another hole was drilled in the shaft of the femur into the marrow lengthwise. A 3/16-inch piece of sterile surgical horn (3½ inches long) was driven through the hole in the head and into the hole in the shaft.

The head and shaft were thus brought in close apposition and then returned to the acetabulum. The muscle and fascia were closed with continuous sutures of No. 1 chromic catgut, the skin and subcutaneous tissue were brought in contact with two lateral tension sutures on either side of the incision, and the incision closed with continuous dermal suture. The entire leg and hip were immobilized in a plaster of Paris cast, leaving a window for drainage and for



Radiograph showing fracture of neck of the femur

observation of the operative area. The dog made an uneventful recovery, the cast being removed in nine days.

The cast on the Irish setter was removed the sixth day to establish better drainage. The dermal suture was removed at this time and sulfanilamide in mineral oil (40%) injected freely under the subcutaneous tissues daily, two interrupted dermal sutures being reinserted. On the day the cast was removed the temperature was 104°F. He was given 50 grains of sulfathiazole orally for three days. It was necessary to supplement his feeding with intravenous administration of 5% dextrose in physiological saline solution (120-150cc daily) for several days. He was given subcutaneously 60cc of canine anti-distemper homologous serum following the operation. Three additional subcutaneous injections of 30cc of serum were given.

FRED B. OGILVIE

Edwardsville, Kans.

Stomach Worm Infestation in a Horse

During late summer, I was called to see a colicky horse on a local horse farm. On my arriving at the farm, I found an emaciated, hide-bound, two-year-old gelding showing uneasiness but no great pain. The pulse, respiration, temperature and peristaltic movements were normal; however, he was constipated. I gave an aloetic ball along with my colic medicine, the main constituent of which is chloral hydrate, and an enema. The colic medicine relieved him; and the next day, the ball cleaned him out.

This horse had just arrived from a Chicago race track where he had been training for eight months. He had never raced because of his poor condition and the fact that he was a poor doer (*anorexia*). His history was that he had been this way during the entire time he was in training and suffered from these colicky spells periodically, always recovering, but never improving in health. These spells occurred following eating. I suspected parasites when I first saw this horse, but he had been given anthelmintic treatment by two veterinarians within the last three months.

Due to the very poor condition of this horse, I advised the owner to forget about racing him. It looked to me as if he would recover from this malady, but it would be unlikely that he could stand the rigorous schedule of training and racing. Nevertheless, the owner wanted him treated, so we proceeded with the following: He was wormed with a mixture of carbon disulphide and phenothiazine after fasting for 18 hours but no worms were recovered. He continued having colicky spells. He was then given, 30 minutes before each meal, two ounces of an elixir of thiamine chloride which served to stimulate his appetite and kept him from having the colicky spells. The owner soon tired of this treatment, as it was quite expensive. Then it was found that if the animal was fed warm mash and warm water, his appetite increased and he showed no restlessness after eating. However, the horse soon tired of this wet feed, and so two ounces of mineral oil was added to each feeding which proved an effective substitute. This was kept up for three months

during which time the horse suffered only one case of colic, but he did not gain any weight and still looked his same old useless self. Finally, the owner had him destroyed.

Post-mortem examination revealed the following lesions: Thickened, indurated pylorus, ileitis, a large amount of dry stomach contents, the presence of a very large number of white hairlike worms (*Habronema megastoma*) on the stomach mucosa. These worms had formed a tumor in the pyloric region which interfered mechanically with the passage of the food from the stomach to the intestine.

This was my first experience with this parasite, and I was not acquainted with the treatment. On investigation with W. W. Dimock of the Kentucky Experiment Station, we found that according to the USDA, there is no treatment known for the removal of *Habronema megastoma*.

W. E. THOMAS

Lexington, Ky.

Control of Rabbit Coccidiosis*

Coccidiosis is an intestinal and liver disease in domestic rabbits. It is of major importance among the parasitic diseases of rabbits and frequently causes heavy losses, especially among the young. The general symptoms are lack of appetite, diarrhea, rough coat, "pot belly," and stunted growth.

Microscopic examination is necessary to establish a positive diagnosis of coccidiosis, as symptoms alone cannot be relied upon. The disease is most readily recognized microscopically when the parasites are in the oocyst stage and are eliminated in the feces.

In a variable period of time, depending upon temperature and moisture, the oocysts develop into an infective stage, at which time, if swallowed, they can become established in a new host. A few of them may even be found in the intestinal tracts of adult rabbits that show no symptoms of coccidiosis. These rabbits are frequently termed healthy carriers of the disease.

How Infection Occurs

Infection is acquired only by ingestion. Soon after the young leave the nest they may soil their feet with the doe's droppings which contain parasites and thus contaminate their food and water supply. Experimental methods have demonstrated clearly that the coccidia of rabbits do not infect domestic fowls, and that fowl coccidia do not infect rabbits.

To prevent losses from coccidiosis, practice strict sanitation at all times—do not depend upon medication. Maintain rabbits in hutches with ⅝-inch wire-mesh bottoms; place guards at three-inch intervals across feed troughs, or otherwise prevent the animals from contaminating their feed; wash the crocks thoroughly every day; keep no boards on the wire bottom of hutches; and do not tolerate accumulations of feed, hay, or fecal material on hutch bottoms or in food or water containers.

*Edward L. Vail, veterinarian, Fur Resources Division of Wildlife Research in *Amer. Natl. Fur and Mkt. Jnl.*

Care of the Domestic Rabbit

Since the beginning of food rationing, the rabbit industry has expanded widely until today there are few communities without at least a few enthusiastic breeders who raise and sell breeding stock and meat to their friends and neighbors—and pelts to the fur trade. It is estimated that there are from 60,000 to 75,000 rabbit breeders in the United States at this time.

If this boom continues, rabbit raising may reach a point where it will compete with other meats as it has done in Europe for many years. The city of Los Angeles consumes nearly 7,000,000 pounds of rabbit meat annually for they have discovered it to be one of the finest of meats.

The rabbit suffers from but few diseases and is easy to raise and on this account the veterinarian may ask, "Why should I bother to know anything about rabbits?" New recruits begin raising rabbits every day and seek accurate information on their care. Suppose that a high school boy comes to a veterinarian's office and asks how old his doe should be before she is bred. If told to wait until she is seven or eight months before breeding her he will think more highly of the veterinarian's ability. In a few years this boy may be an important livestock breeder.

The American Rabbit and Cavy Breeders Association recognizes and sets up standards for 50 breeds of rabbits. The most

popular breeds in my territory are chinchillas, New Zealand whites and reds, Flemish giants, and Angoras which are raised for their wool. The average weight is from 8 to 10 pounds for the chinchillas to 15 pounds or more in the Flemish giants.

The does kindle 30 to 32 days after mating and will average 6 to 12 young to a litter. About a day before kindling the doe will make a nest of any available litter and will pull enough hair from the ventral surface of her body to almost fill the nest box. Waste excelsior makes them a good dry nest. About two days after birth the litter should be reduced in size to six or eight of the strongest members. The young open their eyes at about 10 days of age, and come out of the nest box soon afterwards. They eat well at three weeks and should be weaned at six or eight weeks of age by taking one or two at a time away from the doe. If all are taken away from her at once mastitis may ensue. The sexes should be separated at this time and bucks not wanted for breeding should be marketed. If retained they should be kept in separate enclosures to avoid fighting. Does can be kept together longer.

By the time the young rabbits are three months old they should weigh between four and five pounds. At this time they are excellent eating.

There is some difference of opinion about the time to rebreed a doe. Some recommend breeding the doe 21 days after kindling thus making it possible to raise six litters a year. Others wean the young, rest the doe two weeks and breed—thus she raises four litters a year. Hot weather weakens the spermatazoa of a buck until they are not viable. It has been discovered recently at the Purina Mills research farm that if bucks are kept in a cool place such as a basement, they can be bred successfully to the does all summer. However, they should not copulate more than three times a week. For slow or impotent bucks a few small doses of testosterone propionate will work wonders.

A rabbit will eat anything that a cow will eat. The usual feed consists of alfalfa hay and a small amount of grain or commercial rabbit feed once a day for resting does and twice daily for suckling does with an occasional relish of greens, carrots or green tree twigs. Their fertility declines if they are not given greens. Most beginners overfeed their stock. Fat does are not good breeders.

Domestic rabbits stand heat and cold well and are raised in every state and in Canada. Galvanized wire netting makes the most sanitary floors. Hutches should be 48x20 inches and three feet deep for all except the giant breeds. Nest boxes should be 12x16 inches and one foot high. A large number of animals can be raised in a very small space.

Drafts should be avoided since they cause head colds or "snuffles." Rabbits are healthy animals and not subject to many diseases or parasites. Sanitation and isolation go far toward preventing the spread of disease. Snuffiles can be controlled by the use of some commercial nose drops intended for human use. Ear canker occasionally gets started in a rabbitry. Cleaning the ear with a probe and cotton and packing with an antiseptic powder as one would treat otitis in a dog should relieve this condition. The young are sometimes bothered with coccidiosis. Most large rabbiteries use a commercial sulphur product in its control.

G. W. BAYLES,

Marion, Ill.

Test Mate Your Does

It's a good idea to take a doe back to the buck a few days after she has been bred to test whether she has conceived. If she "growls" and avoids the buck, it's a fairly good sign that she's pregnant. If she accepts him, mate her again.

Quite often a doe that is excited by other females may shed her egg cells before she is brought to the buck. As a result, she may go through a "false pregnancy" period of about 17 days before it will again be possible for her to conceive.

Thus, in all doubtful cases, it's wise to test mate the doe again on the 18th day.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Book Reviews

Allergy. By *Erich Urbach*, M.D., Chief of Allergy Service, Jewish Hospital, Philadelphia; Associate in Dermatology, University of Pennsylvania School of Medicine; Member, Board of Regents, American School of Allergists, with the collaboration of *Philip M. Gottleib*, M.D., Associate on Allergy Service, Jewish Hospital, Philadelphia; Instructor in Medicine, University of Pennsylvania, School of Medicine; Fellow American College of Allergists, 1073 pages, 396 illustrations. Grune & Stratton, New York, 1943. Price $12.00.

The first thought on picking up this immense volume of more than a thousand pages and 400 illustrations, is "How could anyone write such a ponderous tome on a subject so new as allergy?" But on examination the subject is found to be anything but new. "One man's meat is another man's poison" was current 2000 years ago and referred then, as now, to food allergy. In the second century the Babylonian Talmud gave precise instructions on how to combat intestinal egg-hypersensitiveness. Galen knew of allergy to goat's milk and physicians of the middle ages were aware of asthma due to pollens. In 1819 the first account of hay fever appeared and 20 years later Magendie published the first record of experimental anaphylaxis. It was induced in a dog by injection of a foreign serum. Such terms as hypersensitivity and idiosyncrasy have been in frequent use for a long period and in part referred to allergies.

However, the importance of allergy in the present degree is modern. "The medical historian of the future will undoubtedly have to report that the first half of the 20th century was distinguished by an alarming increase in the incidence of allergic diseases in the so-called civilized countries," and again "if it were really true that the hereditary factor is of such great importance [in the incidence of hay fever and asthma] how should we explain the fact that within one generation (1900-1930) the number of cases of these diseases, in America alone, rose from a few tens of thousands to a figure of several millions?" and "The study of allergy has made huge strides in the past 10 years."

The part of this work of greatest concern to veterinarians is hay fever in the dog of which a good description and excellent illustrations are given, allergy due to contact with the products of Brucella organisms, allergy due to animal products, dandruff, hair, feathers, etc., allergy due to bacterial vaccines, diagnostic allergic reactions and serum sickness.

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Formulario de Terapeutica Veterinaria. By *Cicero Neiva*, assistant chief of the Institute of Butanta and Professor of Pharmacology and Therapeutics of the School of Veterinary Medicine of Sao Paulo, Brazil. Paper bound, 307 pages. Published by the Agricultural Information Service, Ministry of Agriculture Rio de Janeiro, Brazil. 1942.

Practically all pharmaceutical and biological products used in veterinary medicine are discussed. The text is arranged alphabetically, botanical drugs, chemicals and biological products all in a single list. The name of the agent; sometimes some of its history; the therapeutic indications, the preparations and dosage for horses, cattle, sheep, swine, dogs and cats and poultry (or for such of these as the agent may be applicable) are given. In addition prescriptions are given illustrating the use of many of the medicaments in combination with other preparations.

Any book reviewed in these pages, or any other book if available, may be obtained by remitting the published price to VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago 49. Bulletins and Circulars should be requested direct from the address given in the notice. Generally they are supplied free unless a price is stated.

A rather surprisingly large number of biological preparations are described, e.g., eight antivenins are listed. However this may be indicative of the importance of snake and scorpion bites of domestic animals in Brazil. Eighteen bacterins, 29 sera and 28 vitamins are included.

The use of colloids, electricity, light, blood, water and heat, diet and venesection in the treatment of disease, are discussed in a separate chapter. Tables are given showing the pulse and respiration rate, gestation period, breeding age and normal tempera-

ture of various animals and birds. The index is unusually complete.

The work is doubtless a convenient and useful one for veterinarians who read the Portugese language.

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Useful Bulletins, Circulars, Etc.

Fowl Pox in Domestic Poultry.—Bul. 411 Agri. Exp. Sta., Oregon State College, Corvallis.

Pullorum Disease of Poultry—Questions Answered.—Special Cir. (Sept., 1943) Univ. of Wisc., Madison.

Intestinal Worms in Range Lambs.—A contribution from the Veterinary Research Laboratory. War Cir. 5, Montana Agri. Exp. Sta., Bozeman.

Diseases of Turkeys.—A 135-page booklet including 60 illustrations by W. R. Hinshaw, University of California, Berkeley, Bulletin 613.

The Effect of Rations on the Production of Urinary Calculi in Sheep.—Tech. Bul. 31, Colorado Agri. Exp. Sta., Fort Collins.

Whey for Livestock.—A discussion of its value for calf feeding and as a feed for swine of all ages. Cir. 340, Univ. of Wisc., Madison.

Pseudopregnancy in Domestic Rabbits.—Wildlife Cir. 4, Fish and Wildlife Service, U. S. Dept. of Interior. Price 5 cents. Obtainable from Supt. of Documents, Washington, D. C.

Sneezeweed Poisoning in Sheep.—Management of sheep on ranges infested with orange sneezeweed. Cir. No. 691, Rocky Mountain Forest and Range Exp. Sta., Fort Collins, Colo.

Report of Montana Livestock Sanitary Board.—Annual report (Dec. 1, 1942, to Nov. 30, 1943) by W. J. Butler, Executive Officer of the Board, State Veterinary Surgeon and Director of Laboratories, Helena. It gives the disease incidence for all domestic animals in the state, a report on milk inspection, meat inspection, the Research Laboratory and of the Bacteriological and Chemical laboratories and statistics of animal importations.

Abstracts

Urinary Calculi in Lambs, Wethers and Rams

The cause of urinary calculi in sheep has long been a puzzler. The condition occurs only in males and is far more prevalent in the fall and winter than it is in the summer. The losses it occasions in feeder lambs has reached 5% in some seasons. "Alkali" water, insufficient water, excess of minerals in the feed, hyperparathyroidism, infection, urinary irritation, vitamin A deficiency and various other factors have at one time or another been considered the cause of this unique lithiasis.

Various feeding trials, some of them extensive, at experiment stations have indicated almost as many different causes as there have been trials. Iowa (1910) tended to incriminate sugar beets and mangels and later (1923) cane and beet molasses, and still later (1939) suggested a high-magnesium carbonate ration. Minnesota (1940) failed to confirm the magnesium theory as to cause. Indiana (1931) gave wheat bran the villain's role. Ohio (1935) blamed a low-calcium, high-phosphorus ration. Oregon (1937) observed calculi in lambs fed a ration deficient in vitamin A. Texas (1941) inclined to the vitamin A deficiency theory. Nebraska (1941-43) found rations containing sorghum grain, cotton seed cake, bonemeal, cane silage, yellow corn and beet top silage all productive of a high percentage (42% to 75%) of urinary calculi in wethers. Idaho (1943) concluded vitamin A deficiency is not a cause of urinary lithiasis in sheep.

In a new bulletin[18] from the Colorado station, a record is given of a feeding trial extending from 1938 to 1943. It exonerates yellow corn, beet tops, beets and alfalfa and affords a good deal of support to Oregon and Texas conclusions that a vitamin A deficiency is the cause of the marked prevalence of urinary calculi in sheep. The Nebraska trial also is suggestive of this. The conclusions arrived at by the Colorado experimenters are:

[18] Newsom, I. E., Tobiska, J. W., and Osland, H. B. The effect of rations on the production of urinary calculi in sheep. Tech. Bul. 31, Colorado Agri. Exp. Sta., Fort Collins.

"A ration composed of cane fodder, bran and white corn seems more likely to produce urinary calculi in lambs than one containing alfalfa or beet tops and yellow corn.

"Such a cane fodder-bran-white corn ration is low in vitamin A, has a narrow Ca:P ratio, requires little water consumption and results in a small urine output.

"The urine from animals on this ration is more nearly neutral, is low in total solids and specific gravity and on standing precipitates out a large proportion of insoluble matter.

"There is some indication that calculi may develop in the presence of adequate amounts of alfalfa when excessive amounts of calcium carbonate and magnesium carbonate are fed in the form of a mineral supplement."

Resistance of Chickens to Coccidiosis

That chickens reared under ordinary flock conditions become resistant to cecal coccidiosis has been known for a number of years.[17] Chickens reared on wire floors and under conditions of strict sanitation retain their susceptibility to infection with *Eimeria tenella*. Recently, it has been shown that a demonstrable immunity can be set up by the administration of controlled doses of sporulated oocysts. When F. administered daily doses of 1,000 sporulated oocysts of *E. tenella* to chickens for 15 days, or when 15,000 oocysts were administered in three doses of 1,000, 5,000, and 9,000 oocysts at five-day intervals, a high degree of resistance was produced. When birds with such an acquired resistance were kept under conditions which almost eliminated the possibility of extraneous infection for six months, it was found that they were still resistant to infection by *E. tenella*. A single heavy dose of oocysts failed to produce an effective resistance.

These results once again point to the possibility of attempting to plan husbandry so that chickens will acquire safely a natural resistance to *E. tenella* by receiving small regular doses of oocysts.

[17] Farr, M. M. Resistance of chickens to cecal coccidiosis. *Poult. Sci.*, 22, pp. 277-86, 1943. Abst. by C. Horton Smith in *Vet. Bul.* 13:12, p. 421, 1943.

The Bone Marrow of Normal Dogs

Incidental to the study of spontaneous lymphomas in dogs Meyer and Bloom[15] deemed it desirable to determine the percentage distribution of marrow cells in normal dogs. As a result of a long series of biopsy examinations in 10 normal, healthy dogs, their observations are:

That an average of 48.32% of the marrow cells are of the myeloid series distributed as follows: neutrophilic myelocytes (3.76%), non-segmented neutrophils (23.5%) and segmented neutrophils (18.5%). The myeloblasts, eosinophilic myelocytes and nonsegmenters, eosinophils, basophils and heterophils together, comprise 2.56%. The erythroid cells average 38.7%, of which the megaloblasts are 1.02%, erythroblasts 2.5%.

Brucellosis, a Health Problem

In man the porcine[12] form of undulant fever is more severe than the bovine type. The infection can be contracted by handling the diseased hog in the living state or by handling the flesh of the diseased hog at the time of slaughter. As this germ is not easily killed by drying, there is reason to believe that the dust or the mud in the hog lot may also be a source of infection. The porcine form of disease in human beings is essentially an occupational disease. Many veterinary surgeons have been ill of this disease at one time or another. Butchers are the second group of persons in whom the disease is occupational and farmers are the third group. The disease is rather common among farmers, although it has many times been called malaria, typhoid, "walking typhoid," bilious fever, arthritis, rheumatism, tuberculosis, general "rundown" condition and many other names. The chronic form particularly is frequently not recognized and may be considered general ill health or a neurosis. It is a public health problem in hog raising states. The satisfactory control of undulant fever is dependent on the control and elimination of brucellosis in farm animals. The author suggests the desirability of immunization of exposed persons.

[15] Meyer, M.D., Leo M., and Bloom, D.V.M., Frank; *J. Am. Med. Sci.*, 206, pp. 637-41, 1943.

[12] Rice, T. B. Chronic undulant fever of swine origin as an important public health problem. Indiana *Sta. Med. Assn. J.*, 37:1, 1944. Abst. in *J. Am. Med. Assn.*

Heparin and Dicumarol

After four years' experience with heparin and dicumarol in the treatment of thromboembolic disease, Lam[11] reports that the two differ in their mode of action. Heparin acts immediately on the whole preformed supply of prothrombin, inactivating it for two or three hours when a single dose is administered. On the other hand dicumarol takes almost two days before the prothrombin is neutralized. Both were used by the author in phlebitis, thrombosis, embolisms and other conditions where it is desirable to inhibit intravascular clotting.

Lack of Pasteurization Plants in Many Communities

According to an official survey[10] 438 communities having a population of 2000 or more and an aggregate population of approximately one and three-quarter million have no plants in which to pasteurize the milk they consume. In 14 states, Arizona, Delaware, Indiana, Maryland, Massachusetts, Michigan, Missouri, Nebraska, New York, Ohio, Oregon, Rhode Island, Vermont, and Virginia, all public milk supplies, for communities having a population of 2000 or more, are pasteurized. Texas, needing 47 plants for a population of 183,836 and Georgia, needing 45 plants for a population of 203,200, are the most backward states in milk control.

Diagnosis of Brucellosis

The actual frequency of brucellosis is much higher than that which has been usually reported in the literature.[13] In the last few years 739 cases were observed in the Hospital del Rey (Spain). As the clinical manifestations of the disease are so protean and irregular, diagnosis must rest on laboratory tests. Of these tests the intradermal reaction using Brucella vaccine proved to be the most sensitive. In 107 cases of brucellosis in which it was employed, the skin test was positive in 97.1%. There was no direct correlation between the skin test and the agglutination reaction. In 18 cases (17.3%) a positive intradermal reaction was associated with a negative agglutination reaction, which indicates that the serologic factors responsible for allergic and immunization reactions are different.

[11] Lam, C. R., Anticoagulants—Heparin and dicumarol. *Mich. State Med. Soc. J.*, 42, p. 968, 1943.
[10] *U. S. Public Health Reports*, 59:6, pp. 189-204, 1944.
[13] Simón, Vallejo, and Egea, J. F. Diagnosis of brucellosis. *Medicina* Abst. in *J. Am. Med. Assn.*

Life Cycle of a Nemotode of Fowl

Capilaria worms in poultry are of material economic importance. Morehouse[16] in a study of the capallarids of the lower digestive tract of various birds found *Capillaria caudinflatum* the more common in the Midwest and *C. columbae* the more prevalent east of the Appalachian Mountains.

C. caudinflatum could not be transmitted by feeding embryonated eggs directly to chickens but was transmitted readily through earthworms of the species *Halodrilus caliginosus*.

The life cycle of *C. caulinflatum* required 42 to 45 days; 11 to 12 days for embryonation of the ova, 9 days for development in the earthworm and 22-24 days for development in the chicken.

Bone Fixation in Compound Fractures

Internal metallic fixation[19] in compound fractures both in the United States and overseas has been followed in some cases by chronic osteomyelitis and nonunion. Examination of many compound war fractures treated by plating and others treated by careful débridement followed by cast or splinting, with skin or skeletal traction as necessary, indicates that the latter conservative principles yield better results. The nature of the injuries and the variable circumstances of treatment and evacuation involved in the Army are not favorable for initial extensive surgical treatment of the fractures. The use of skeletal fixation by multiple pins fixed by plaster or mechanical means has likewise resulted in bone infection in the pin wounds. The use of pins in the vicinity of traumatic or operative wounds is especially discouraged.

[16] Morehouse, Neil Francis, Doctoral Thesis No. 692-A, Iowa State College of Agriculture and Mechanic Arts.
[19] Compound fractures and wounds of extremities. *Bul. U. S. Army Med. Dept.*, 73, pp. 7-9, February, 1944.